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JOSHI (K. G.) & PANDITRAO (D. B.). **Albinism in Sugarcane.**—*Curr. Sci.*, xi, 10, pp. 402–403, 1942.

Attention is drawn to the occurrence of 'albinism' on the leaves of the Pounda variety of sugar-cane grown under sewage irrigation at Nagpur, India. White, slightly raised, yellow-bordered patches, 0·5 to 9 cm. in length, developed along the midribs on the under sides of the second to the ninth leaves, the intermediate ones being affected in some cases, while in others they were free from the defect. Slight discolorations on the upper surface corresponded to the 'albino' areas, which affected some 20 to 25 per cent. of the stands, without, however, impairing their general health. No evidence of insect, bacterial, or fungal invasion was revealed by a microscopic examination of the diseased areas, and the cause of the condition is under investigation.

WAKEFIELD (E[LSIE] M.) & BISBY (G. R.). **List of Hyphomycetes recorded for Britain. Supplementary note.**—*Trans. Brit. mycol. Soc.*, xxv, 4, p. 427, 1942.

The authors supply five corrections to their list [*R.A.M.*, xx, p. 495] and add several records which were made since its publication, as well as one, *Aspergillus restrictus*, causing mildew in cotton goods, which was omitted.

DEARNESS (J.) & HOUSE (H. D.). **New or noteworthy species of New York fungi. V.**—*Circ. N.Y. St. Mus.* 24, pp. 25–60, 1940. [Received February, 1943.]

This list [cf. *R.A.M.*, vi, p. 126; viii, p. 66], dealing with collections of fungi mainly from New York State, contains the names of 37 new species and 48 new records for the State, the fungi belonging to the Phycomycetes, Ascomycetes (chiefly Pyrenomycetes), Basidiomycetes, Sphaeropsidales, and Moniliales. Mention may be made of the following: *Phyllosticta dearnessii* on living and languishing leaves of *Rubus pubescens*; *P. destruens* on living leaves of *Prunus virginiana*; *Sphaeronema pithyum* on living and dying trunks of *Pinus strobus*, trees severely infected showing a general thinning of the foliage and a shortening of the needles, which are pale or yellowish; *Cytospora translucens* attacking small branches and twigs of *Salix alba*, causing the death of the leaves above the point of infection; *Macrosporium araliae* n. sp. on living leaves of *Aralia racemosa*, forming dark brown, irregular spots extending along the veins, with conidia very variable in shape, 10 to 30 μ in width, the spore body 30 to 120 μ in length, and the 'pedicels' 30 to 175 μ long; *Cercospora cichorii* on living and languishing chicory leaves; and *Fusarium episphaericum*, parasitic on the black knot fungus (*Dibotryon morbosum*) on *Prunus virginiana*.

GÄUMANN (E.). **Zur Kenntnis einiger Umbelliferen-Puccinien.** [A contribution to the knowledge of some *Pucciniae* on Umbelliferae.]—*Ber. schweiz. bot. Ges.*, li, pp. 143–164, 1941. [Abs. in *Zbl. Bakt.*, Abt. 2, cv, 10–11, p. 194, 1942.]

Among the changes made in the taxonomic position of certain species of *Puccinia*

on Umbelliferae on the basis of statistical measurements may be mentioned the reference of *P. petroselini* [*R.A.M.*, xi, p. 73], *P. arethusae*, and *P. silai* to the collective species *P. bullata*.

MUNDKUR (B. B.). **Taxonomic studies of Indian smuts.**—*Anniv. Vol. R. bot. Gdn, Calcutta, 1942*, pp. 221–225, 1942.

This is a brief historical review of the smut collections made in India. Up to the end of the nineteenth century 20 representatives of this group of fungi had been discovered, of which 18 were new species. From 1904 to 1914 about 76 collections were made by Sir Edwin Butler, and these included 30 new species. By the end of 1938, the total number of smuts recorded for the country was 110, including seven new species in the 43 collections examined by the writer, who since then has proposed further new species and new combinations [*R.A.M.*, xviii, p. 627; xix, p. 237; xx, p. 179].

DAVIDSON (R. W.). **Some additional species of Ceratostomella in the United States.**—*Mycologia*, xxxiv, 6, pp. 650–662, 4 figs., 1942.

This list of species of *Ceratostomella* isolated from decayed wood, but as far as is known not associated with disease in the host, includes three new species, *C.* (*Ophiostoma*) *microspora*, *C.* (*Grosmannia*) *leptographioides*, and *C.* (*G.*) *rostrocylindrica*, and also *C. stenoceras* and *C. minutum*. The author expresses the opinion, based on a study of a considerable number of species of most known groups of the genus *Ceratostomella*, that neither the ostiolar filaments nor any other perithecial character can be used in separating the groups of this genus. Conidial stages are considered more reliable for placing the species in their natural groups. The endoconidial group has already been separated by the author and placed in the genus established by Münch [*Endoconidiophora*: *R.A.M.*, xiv, p. 729], and the *Leptographium* forms are believed to constitute a separate genus. The remaining species will probably prove, following further investigations, to represent a heterogeneous mixture of closely related groups and will then be placed in the genus *Ophiostoma*. It is pointed out, however, that whereas many species of *Ophiostoma*, *Grosmannia*, and *Endoconidiophora* groups have been carefully studied in pure culture, none of the species of *Ceratostomella* with persistent asci is known to have been studied in culture, and that it is possible, therefore, that there may not be distinct cultural differences between them.

LINDER (D. H.). **A contribution towards a monograph of the genus Oidium (Fungi Imperfecti).**—*Lloydia*, v, 3, pp. 165–207, 7 figs., 1942.

The present paper was begun as a monograph of the genus *Rhinotrichum*, but in the course of several years' studies the author arrived at the conclusion that this genus, in the sense of Corda, is untenable and must give way to *Oidium* Link, as typified by Corda's illustration of the type species under the name *Torula aurea* (Link) Corda. This concept of *Oidium* agrees with that adopted by Sumstine (*Mycologia*, v, pp. 45–61, 1913), although his method of distinguishing the two genera by their manner of spore production is not considered a reliable criterion. The first genus to be described which would include those species that are now treated in *Oidium*, is stated to be *Acladium* of Link, but the name cannot be used since Fries reduced *Acladium* to synonymy under *Sporotrichum*. Those species that have been allocated to this genus by medical mycologists must, therefore, be removed elsewhere. Other genera of the Fungi Imperfecti containing species more properly placed in *Oidium* as interpreted by the author, are *Monilia*, *Oïpitrichum*, *Rhinocladium*, and *Zygodesmus*. The reasons advanced in favour of using *Oidium* in its original meaning are as follows: (1) the genus may readily be legally typified; (2) by thus typifying the genus, the way will be paved for accepting *Sporendonema*

of Desmazières for those forms represented by *Oidium* or *Oospora lactis* and *O. casei*, and *Acrosporium* of Nees for those species which are the conidial stages of the Erysiphaceae; (3) the number of name changes is not excessive; and (4) the plea of general usage is rejected on the grounds that the practice of conservation should be applied only when an original species or genus cannot be readily typified, or in those cases in which excessive name-changing would result in confusion harmful to the advance of botany as a whole.

The author gives an annotated list, with descriptions and synonyms, and a key, of the 31 species placed by him in the genus *Oidium*. With a few exceptions, these species are predominantly saprophytic and grow on decaying wood, occasionally on old fructifications of members of the Polyporaceae, or on the ground. Some at least are conidial states of Thelephoraceae. Notes are also given on excluded and doubtful species.

Jacques (J. E.). **Studies in the genus Heterosporium.**—*Contr. Inst. bot. Montréal* 39, 46 pp., 6 pl., 1941.

A comparative study of seven species of *Heterosporium*, viz., *H. iridis* (Faut. & Roum.) n. comb. (syn. *Scolecotrichum iridis*) [*H. gracile*], *H. phlei*, and *H. robiniae* (collected by the author near Ithaca, New York), *H. allii* and *H. ornithogali* (isolated from fresh material obtained from Illinois), and *H. echinulatum* and *H. variabile* (from the Centraalbureau voor Schimmelcultures, Baarn, Holland), examined in the living state on potato dextrose agar, prune agar, and sterilized portions of the leaves of suscepts, showed that they fell roughly into three groups. The first comprised *H. gracile* only, the dimensions of the conidiophores (primary portion 25 to 200 or more by 6 to 16 μ) and conidia (20 to 98 by 11 to 25 μ) of which were approached by none of the remaining species; the ascigerous stage of this species (*Didymellina macrospora*) is also characterized by very large reproductive structures. *H. gracile* appears to be very closely related to certain species of *Helminthosporium*; for example, *H. gramineum* would easily be confused with it, but for its roughened epispore.

The second subdivision, comprising *Heterosporium allii*, *H. echinulatum* (the imperfect stage of *D. dianthi*), and *H. ornithogali*, forms an intermediate group approaching *Helminthosporium dematioideum* in the size and shape of the conidia and conidiophores and in the occasional occurrence of solitary conidia. The production of catenate spores, on the other hand, would appear to connect this group with *Cladosporium*.

The third group, represented by *Heterosporium phlei*, *H. robiniae*, and *H. variabile*, resembles *Cladosporium* more than any other genus of black moulds. *H. variabile* may become so modified as to be taken for a typical *Cladosporium*. *H. phlei* is possibly a pathogenic race of some other species recorded on Gramineae. These three species are so nearly indistinguishable that complete dependence on spore characters is necessary for their recognition.

In the course of the present study the ascigerous stage of *H. ornithogali* was discovered in monoconidial cultures on both potato dextrose agar and sterilized leaves of *Ornithogalum umbellatum*. It is named *D. ornithogali* n. sp.

Bitancourt (A. A.) & Jenkins (Anna E.). **New discoveries of Myriangiales in the Americas.**—*Proc. eighth Amer. sci. Congr.*, Biol. Sci., Bot., pp. 151–172, 10 pl., 1940 (issued 1942).

Full descriptions and technical diagnoses are given of five new species of *Elsinoe*, and five of *Sphaceloma* [*R.A.M.*, xxi, p. 428], collected in Brazil and other States of Latin America, Florida (three), Dutch Guiana (one), and Puerto Rico (one). *S. spondiadis* produces a scab on the leaflets, midrib, and small stems of *Spondias purpurea* in Florida and a severe spotting of the fruit of *S. dulcis* in the Federal

District, Brazil. It is characterized by yellow to light brown, pseudoparenchymatous sporodochial masses, 30 to 150 μ in diameter, up to 60 μ in thickness, and a semi-continuous stroma, dark brown on the surface, paler below, up to 100 μ in diameter and 30 μ in thickness; crowded, subulate conidiophores were sometimes detected, but no conidia. *E. annonae*, the agent of anthracnose of *Annona cherimolia*, *A. squamosa*, and other *A.* spp. in São Paulo, Brazil, and believed to be also present in Venezuela, may be identified by its globose to piriform asci, 20 μ in diameter, containing up to eight hyaline, triseptate, usually straight spores, 12 to 15 by 5 to 8 μ; acervuli 40 μ in diameter, 20 μ in thickness, covering the old lesions with a deep greyish-olive layer; and a dense palisade of conidiophores arising from a thin basal stroma, conidia not having been observed. *Sphaceloma punicae* (*Hadrotrichum populi* Montem. non Sacc.) [ibid., xii, p. 661] causes a foliar anthracnose of pomegranate in Corrientes, Argentine, and São Paulo, and a fruit spot of the same host in the Pavia district of Italy, where the fungus was identified by Montemartini as *H. populi*. The hyaline to pale yellowish stroma, 15 to 40 μ in thickness, gives rise to a dense palisade of closely appressed conidiophores, 10 to 15 by 3 to 5 μ; conidia did not develop, but microconidia were abundant on the surface of the acervuli.

Negroni (P.) & Fischer (Ida). **A propósito de Tritirachium Limber, 1940, nuevo género de Moniliaceae.** [A propos of *Tritirachium* Limber, 1940, a new genus of the Moniliaceae.]—*Rev. Inst. bact., B. Aires*, xi, 2, pp. 259–262, 2 figs., 1 diag., 1942. [French and English summaries.]

In view of the morphological affinities between Limber's genus *Tritirachium* (*Mycologia*, xxxii, pp. 23–30, 1940) and *Beauveria*, the authors recommend a comparative study of the species of the two genera.

Seeler (E. V.). **I. Two tree diseases caused by a species of Thyronectria. II. A monographic study of the genus Thyronectria.**—*Summ. Theses Ph. D. Harv., 1940*, pp. 79–82, 1942.

The first part of the author's thesis has already been noticed from another source [*R.A.M.*, xix, p. 734]. In connexion with his monograph on *Thyronectria*, all species of the Nectriaceae with muriform ascospores were examined and the ordinary criteria for generic separation of spore colour and extent of stromatic development found to be unreliable for application within this group. The following genera founded on these unstable characters have been reduced to synonymy: *Pleonectria* Sacc., *Chilonectria* Sacc. (in part), *Megalonectria* Speg., *Mattirolia* Berl. & Bres., and *Thyronectroidea* Seaver.

From a study of all the available material 16 species have been recognized, one of which is described for the first time as *Thyronectria lonicerae* on *Lonicera* and *Symphoricarpos* from Colorado and North Dakota, while the remainder are furnished with amended diagnoses, nine as new combinations. An analytical key, hitherto lacking, has also been compiled for the determination of these species. The conidial stages of *T. austro-americana* [loc. cit.] and *T. missouriensis* are described, the latter for the first time, and referred to *Gyrostroma* Naoumoff as *G. austro-americana* and *G. missouriensis*, respectively, Wollenweber's scheme [ibid., v, p. 700] being followed whenever practicable.

Voorhees (R. K.). **Life history and taxonomy of the fungus Physalospora rhodina.**—*Bull. Fla agric. exp. Sta.* 371, 91, pp., 16 figs., 1942. [Abs. in *Exp. Sta. Rec.*, lxxxvii, 6, p. 808, 1942.]

From a study of the different forms of *Diplodia* and related genera on tropical and subtropical hosts the author was convinced that only a few specific fungi were being dealt with and that many names of pathogens belonging to this group could

be reduced to synonymy. In the present investigations about 100 monospore isolates of *Physalospora rhodina* [*R.A.M.*, x, p. 96; xvii, p. 670] from various tropical and subtropical hosts in the southern United States and elsewhere were studied in detail and it became evident that an indefinite number of races were involved, very similar in appearance but differing in one or more characters. Many of the races were observed to arise in the sexual stage in nature. Nearly all were mutually differentiated by aversion reactions in culture, and frequently also by their growth rate and type, pigmentation, and perithecial characters. The sex factor or factors were shown to be carried by the ascospores in different ratios in the ascus. Slight differences in pathogenicity were detected between the individual races in certain cases, but no definite evidence of host specialization was forthcoming. The morphological variations among the conidial collections of *P. rhodina* examined are not considered sufficiently wide to merit specific distinction. At least three species of *Physalospora* exist which are not differentiable by their *Diplodia* stages, so that the sexual stages of many of the imperfect forms included under *P. rhodina* may, as indicated above, fall in undescribed species of *Physalospora* or related genera. The paper is furnished with a bibliography of 86 titles.

Subba Rao (M. K.). **The deterioration of Grevilleas on South Indian Tea plantations.**—*Pap. Tea sci. Sect. unit. Plant. Ass. sth. India* 3, 12 pp., 1942.

Much of the information contained in this summary of the observations on the deterioration of *Grevillea* [*robusta*] in southern India has already been published in the annual reports of the United Planters' Association [*R.A.M.*, xxi, p. 48]. In the present contribution the predominating responsibility of meteorological factors (notably wind and prolonged rain followed by severe drought), impoverished soil fertility, root competition, and ageing for the unthrifty condition of the trees is confirmed, the part played in its development by fungi (*Phyllosticta* sp. and *Cercospora* sp.) being purely secondary. Control measures aimed at the maintenance of this valuable and relatively hardy shade tree in a vigorous state of health are indicated. They include an age limit for standing trees of 25 years, selection of seed from the better-grown individuals in areas of poor development, and pollarding in wind-swept regions.

Clayton (E. E.) & Smith (T. E.). **Resistance of Tobacco to bacterial wilt (Bacterium solanacearum).**—*J. agric. Res.*, lxv, 12, pp. 547–554, 3 figs., 1942.

In field and greenhouse trials conducted from 1934 to 1941 in North Carolina, none of the wild species of *Nicotiana* tested showed any resistance to bacterial wilt, *Bacterium solanacearum* [*R.A.M.*, xxi, p. 227]. Of the 1,034 collections of *N. tabacum*, chiefly from Mexico and Central and South America, Davis Special and a considerable number of foreign collections showed slight and T.I.79A and Turkish Xanthi moderate resistance. The only highly resistant tobacco was T.I.448A from Colombia, which was also highly resistant to common tobacco mosaic. This strain suffered less than 10 per cent. mortality under disease conditions which induced 100 per cent. mortality in susceptible types. A highly wilt-resistant genotype, 79–X, was obtained by crossing the above-mentioned moderately resistant types, T.I.79A and Turkish Xanthi, but it produced a very poor quality tobacco.

Valleau (W. D.). **Control of the common mosaic disease of Tobacco by breeding.**—*Phytopathology*, xxxii, 11, pp. 1022–1025, 1942.

Three promising lines are being pursued in connexion with the writer's endeavours to develop commercially desirable, mosaic-resistant varieties of Burley and dark tobacco at the Kentucky Agricultural Experiment Station, viz. (1) the hybridization of suitable varieties with *Nicotiana digluta* and repeated backcrossing; (2) the same processes, substituting Ambalema for *N. digluta* [*R.A.M.*,

xvii, p. 417]; and (3) repeated back-crossing of the best Ambalema type resistant plants (A) on similar plants having the *glutinosa* type of resistance (N) with a view to combining the two types of resistance. Objections have recently been raised to the introduction of the N factor in the control of tobacco mosaic [ibid., xxi, p. 227], but these appear from the author's experience to be devoid of foundation. The theoretical considerations in favour of the N element are discussed and supported by experimental data: for instance, of 441 plants containing this factor, 435 developed necrotic lesions on inoculation in the field in June, 1941, otherwise remaining healthy (Nn or NN), only six contracting systemic necrosis.

As regards the A type of resistance, the risk of systemic infection under farm conditions is negligible, but there is a real danger of the systemic development in N plants of a mottling strain of the virus as reported by Blood and Watson in connexion with *Datura meteloides* (*Proc. Utah Acad. Sci.*, xv, pp. 15–19, 1938). The combination in one variety of the two types of resistance will overcome both these hypothetical difficulties. When ten strains (294 plants) of Burley, heterozygous for N and back-crossed with A type resistant plants, were inoculated with the virus in the field, 245 showed no external signs of infection, 46 developed systemic mottling, and three showed a few chlorotic ring patterns on the lower leaves.

It would thus appear safe to conclude that both the A and N types of resistance, singly or in combination, will give satisfactory practical control of tobacco mosaic if incorporated in a homozygous condition in desirable commercial varieties.

Doolittle (S. P.) & Beecher (F. S.). **A strain of Tobacco-mosaic virus causing a necrosis and shriveling of Tomato foliage.**—*Phytopathology*, xxxii, 11, pp. 986–994, 2 figs., 1942.

During the past six years, greenhouse tomatoes at Beltsville, Maryland, have occasionally suffered from a mosaic disease causing foliar shrivelling and necrosis, which had already been observed in 1930 on plants grown under glass at Washington, D.C., and Arlington, Virginia. The disorder, which has only once been noticed in the field, is responsible for considerably more damage to tomatoes than the ordinary or yellow strains of tobacco mosaic (*Marmor tabaci* vars. *vulgare* and *aucuba*, respectively). The symptoms include the development on the older leaves, 12 to 15 days after inoculation, of small, diffuse, yellow areas, to which a characteristic russet-orange tinge is imparted by a minute, reddish-brown, necrotic stippling; the rusty patches gradually merge into large, light brown, papery spots, generally extending to the margins of the leaflets, inducing downward curling, torsion, and some degree of malformation. In plants 12 to 18 in. in height at the time of inoculation subjected to abnormally low temperatures (65° to 70° F.) for three or four days preceding the appearance of the symptoms, the entire leaflet may rapidly turn yellow, the small veins showing fine, necrotic markings. At an advanced stage of infection, the leaves wither from the base upwards, but remain attached to the plant, this feature of the mosaic being liable to confusion with injuries resulting from fumigation or chemical treatment. The disease progresses most rapidly at a temperature range between 60° and 75°. The virus is easily transmissible by the ordinary leaf-rubbing technique or by the alternate brushing, handling, and pruning of diseased and healthy plants.

The host range of the leaf-shrivelling virus, to which the name of *M. tabaci* var. *siccans* var. nov. is applied, appears to be identical with that of tobacco mosaic, and the former produces on Samsun tobacco, *Nicotiana rustica*, *N. paniculata*, *N. quadrivalvis*, and *N. glutinosa* the same symptoms as the latter. An aberrant feature of the new virus on *N. glauca* is the superficial, reddish-brown stippling, while on *N. sylvestris* dark brown, circular, necrotic primary lesions of the aucuba type are produced, systemic infection developing on the latter host at high summer

temperatures (90° to 95°) accompanied by veinal necrosis and the death of all the leaves except the youngest. The symptoms induced by *M. tabaci* var. *siccans* on chilli (*Capsicum frutescens*), *Physalis angulata*, *P. pubescens*, *P. heterophylla*, *P. alkekengi*, *Datura stramonium*, and Scotia bean (*Phaseolus vulgaris*) resemble those of tobacco mosaic.

In its physical properties and serological relationships the leaf-shrivelling virus also appears to be akin to that of tobacco mosaic, the thermal death point of both lying between 90° and 95° C., the dilution end point at 1 in 1,000,000 (consistent infection occurring on tobacco and *N. glutinosa* at 1 in 100,000), and their period of active persistence in dried foliage at room temperature up to seven years. On *N. sylvestris* previous infection by *M. tabaci* var. *siccans* protects the plants against the aucuba strain of the tobacco mosaic virus from tomato.

Seed transmission of the leaf-shrivelling virus has occurred in 5 out of 342 tomato seedlings grown from freshly extracted seed of diseased fruits, but not in those raised from seed subjected to more than ten days' drying. For the time being, the sources of primary infection remain in doubt.

Thomas (W.) & Mack (W. B.). **A foliar diagnosis study of greenhouse Tomato plants showing symptoms of streak disease.**—*Proc. Amer. Soc. hort. Sci.*, xxxix, pp. 319–328, 3 diags., 1941.

In greenhouse tests at the Pennsylvania Agricultural Experiment Station on differentially fertilized tomatoes with and without manure, the plants (Marglobe) on one plot given nitrogen (sodium nitrate) only without manure developed symptoms of streak ten weeks after planting. The method of foliar diagnosis [*R.A.M.*, xxi, p. 269] was applied and the results denoted that the streak symptoms were associated with a lower intensity of nutrition and a disequilibrium with regard to nitrogen, phosphoric acid, and potash manifested primarily by excessively high values for nitrogen in relation to potash in the nitrogen-phosphorus-potassium unit of diseased compared with healthy plants.

Davis (S. H.). **Poplar canker. On the susceptibility of various Poplar species.**—*Bull. Morris Arbor. Univ. Pa*, iv, 3, p. 28, 1942.

A survey of poplars in the nursery of the Morris Arboretum, Pennsylvania, showed the following varieties to be free from canker due to *Dothichiza* [*populea*: *R.A.M.*, xix, p. 68]: *Populus alba nivea*, *P. alba richardii*, *P. brevifolia*, *P. euphratica*, *P. generosa*, *P. maximowiczii*, *P. tomentosa*, *P. trichocarpa*, and *P. genera*.

Campbell (W. A.) & Spaulding (P.). **Stand improvement of northern hardwoods in relation to diseases in the Northeast.**—*Occ. Pap. Allegheny For. Exp. Sta.* 5, 25 pp., 9 figs., 1942. [Mimeographed.]

The most serious disorders in the hardwood forests of the north eastern United States are cankers caused by *Nectria* [*R.A.M.*, xx, p. 139], *Eutypella parasitica* on maples [ibid., xix, p. 243], *Hypoxylon blakei* on red and sugar maples (*Acer saccharum* and *A. rubrum*), and *H. pruinatum* on aspen (*Populus* spp., including *P. tremuloides*) [ibid., xix, p. 505], and various rots caused by a number of Polyporaceae. The latter group comprises (*a*) those with perennial conks on living trees, viz., *Fomes igniarius*, the agent of a white trunk rot affecting nearly all hardwoods except oak; *F. applanatus* [*Ganoderma applanatum*], causing a mottled white rot of many hardwoods, its sporophores being common, for instance, on street maples [*Acer* spp.], developing on wounds or near large dead branch stubs; *F. pinicola*, the brown cubical rot due to which chiefly affects conifers but is also common on vigorous black cherry (*Prunus serotina*) on the Allegheny Plateau, causing a severe top and trunk rot; *F. connatus*, the agent of a white, soft, watery

rot of sugar and red maples and other hardwoods [ibid., xix, p. 310]; *F. fraxinophilus* [ibid., xviii, p. 280], inducing a white to yellowish top and trunk rot of American ash (*Fraxinus americana*); *F. fomentarius* on birch and maple; and *Daedalea unicolor*, the white rot produced by which is mostly found on maple, though nearly all hardwoods are liable to infection; (*b*) those forming sterile 'conks' or cankers on living trees and sporophores on the same hosts after death, viz., *Poria obliqua*, which causes a white rot of birches indistinguishable from that caused by *F. igniarius*, and the sterile, black, clinker-like conks of which have been considered to belong to that species and *F. nigricans* [ibid., xix, p. 56], *Ostrya virginiana* being another host of the fungus; *Polyporus glomeratus*, the cause of an important soft, white or yellowish decay of *A. rubrum* and *A. saccharum* and beech trunks [ibid., xix, p. 125], the sterile conks on the maples sometimes protruding conspicuously, and on beeches somewhat resembling those of *Poria obliqua* on birches; and *F. igniarius* var. *laevigatus* [ibid., xx, p. 503], most frequently occurring on dead trees or logs of birch; and (*c*) those forming annual sporophores on living trees, viz., *Polyporus sulphureus*, chiefly on oak, though black cherry is also frequently attacked and birch, maple, and ash occasionally; *Hydnum septentrionale* and *H. erinaceus* [ibid., xix, p. 246] form fruiting bodies on living trees, the former being prevalent on *A. saccharatum* and the latter on oak, while both occur on beeches.

Armillaria mellea is the agent of a soft, white, watery root and butt rot of a number of hardwoods, and *Ustulina vulgaris* is found chiefly on *Acer* spp. and beech, inducing a characteristic white butt and trunk rot intersected by numerous irregular, black lines [ibid., xix, p. 624].

'Burls' or abnormal swellings of varying size and shape may be seen on nearly all hardwoods; some are believed to be of bacterial origin, while one on oak is known to be associated with a fungus. Fusiform 'burls', starting as localized swellings, and usually developing into cankerous areas, are prevalent on *A. saccharatum* throughout the region under observation. The greenish-black discoloration of the underlying sapwood may penetrate to the cambium. The same tree is liable to greenish stains resulting from various causes, e.g., chemical reaction and *Nectria* cankers, while a blackish discoloration of the central core of older trees is known as 'black-heart'. The value of *A. saccharatum* depending largely on the whiteness of the sapwood, such stains may assume considerable importance. The prevention of the trunk injuries through which the pathogenic agencies gain ingress appears to be the sole means of control. 'Red heart' of paper and yellow birches (*Torula ligniperda*) [ibid., xx, p. 326] may be responsible for substantial economic damage.

Among the recommendations made for stand improvement are the selection of rot-free, 15- to 25-year-old trees and the avoidance of wounds inflicted by careless felling, sun scorch, wind, insects, and the like. Most canker infections occur before the age of 25 years and canker-free trees selected at this age can be expected to remain healthy. Stand improvement is not usually justified on a heavily cankered site since succeeding hardwoods cannot be expected to do better. The main purpose of stand improvement being the production of an abundance of high-grade timber in the shortest possible time, any method adopted should aim at an increase in the percentage of sound trees of desirable species left to grow. Older stands already damaged by rot should be harvested as early as practicable. The amount of potential inoculum may be reduced by the felling of trees bearing 'conks' of heart-rotting fungi, which should preferably be utilized for firewood. It is unnecessary and even undesirable, however, to cut down all 'conk'-bearing trees, e.g., *A.* spp. and beech infected by *P. glomeratus* and birch by *Poria obliqua*, spore production on which takes place only after the death of the host. In such cases it is both safe and advisable to leave such trees to maintain the canopy. For the improvement of sprout stands 15 to 25 years old, it is recommended that the crop

trees should be selected from clumps of not more than four sprouts, that the most promising sprout should be retained and the others removed, that if an unwanted stem has a low connexion with the favoured one, it should be cut so as to leave a short stub, and that a sprout should not be considered a good risk if the removal of an unwanted stem causes a wound more than 3 in. in diameter.

POMERLEAU (R.). **Liste annotée des maladies parasitaires des arbres observées dans le Québec.** [An annotated list of the parasitic diseases of trees observed in Quebec.] —Minist. Terres For. (Québec), Serv. for., 39 pp., 1942. [Mimeographed.]

In this annotated list of parasitic diseases of trees observed by the author in Quebec during the past 20 years and mentioned by other workers, the trees are arranged in the alphabetical order of their French names, conifers preceding deciduous trees; English and Latin names are also given. The popular name of each disease appears in French and English, followed by the name of the pathogen, intermediate host (if any) in Latin, the importance and geographical distribution of the disease also being noted.

The work is intended to be only of a provisional nature, and to be followed by a further edition, with corrections and additions, in a more permanent form.

GRAVES (A. H.). **Breeding work toward the development of a timber type of blight-resistant Chestnut: report for 1941.**—*Amer. J. Bot.*, xxix, 8, pp. 622–626, 3 figs., 1942.

This progress report on chestnut breeding for resistance to blight (*Endothia parasitica*) [*R.A.M.*, xxi, p. 173] records the results of breeding various chestnut species and hybrids during 1941. It is stated that the possibility of natural variation in resistance to the disease should not be overlooked, and a plea is made for native nuts to be sent to the Brooklyn Botanic Garden.

EHRLICH (J.). **Occurrence of Gonatorrhodiella highlei in Nova Scotia and New Brunswick.**—*Mycologia*, xxxiv, 6, p. 705, 1942.

The author records the occurrence of *Gonatorrhodiella highlei* in association with *Nectria coccinea* and the woolly beech scale (*Cryptococcus fagi*) [*R.A.M.*, xvi, p. 645] on diseased beech stands throughout Nova Scotia and in Albert County, New Brunswick, during the summers of 1930, 1931, and 1932.

BRAUCHER (O. L.) & SOUTHWICK (R. W.). **Correction of manganese-deficiency symptoms of Walnut trees.**—*Proc. Amer. Soc. hort. Sci.*, xxxix, pp. 133–136, 2 figs., 1941.

Satisfactory control of manganese deficiency in English walnuts in Ventura County, California, the symptoms of which include interveinal mottling, followed by bronzing and sometimes by scorching, has been obtained by (*a*) the injection into holes 2 to 4 in. in depth and $\frac{3}{8}$ in. in diameter of dry manganese sulphate at the rate of 5 gm. per hole and four holes per limb of 4 to 6 in. in diameter, the treatment being applied during the summer or winter; and (*b*) spraying in May and June with solutions of the same compound at concentrations of 5, 10, or 15 lb. per 100 gals.; stronger doses (20 or 25 lb.) are apt to induce severe leaf burn.

LOUSTALOT (A. J.) & HAMILTON (J.). **Effects of downy spot on photosynthesis and transpiration of Pecan leaves in the fall.**—*Proc. Amer. Soc. hort. Sci.*, xxxix, pp. 80–84, 1 graph, 1941.

The results of experiments at the United States Pecan Field Station, Brownwood, Texas, in the autumn of 1940 afforded unmistakable evidence of a marked reduction in the photosynthesis of the leaves of a nine-year-old Western pecan tree attacked by downy spot (*Mycosphaerella caryigena*) [*R.A.M.*, xi, p. 552], the differences

between normal and diseased leaflets in this respect being more pronounced during the morning than later in the day. The average morning assimilation rates of the healthy and infected leaflets were 4·59 and 3·13 mg. carbon dioxide per 100 sq.cm. per hour, the corresponding figures for the afternoon being 3·38 and 2·63 mg., respectively. The average morning transpiration rates of the normal and spotted leaflets were 0·55 gm. per 100 sq.cm. water and 0.47 mg., respectively, the corresponding afternoon figures being 0·48 and 0·46 mg., respectively. In the morning, high assimilation rates generally corresponded with high transpiration rates whereas in the afternoon the relationship between the two processes was usually reversed.

MARTÍNEZ (J. B.). **Las micosis del Pinus insignis en Guipúzcoa.**—[The mycoses of *Pinus insignis* in Guipúzcoa.]—[*Publ.*] *Inst. for. Invest. Exp., Madr.*, xiii, 23, 72 pp., 13 pl. (1 col.), 2 diags., 1942. [French, English, and German summaries.]

Pinus radiata (*P. insignis*) in the province of Guipúzcoa, northern Spain, is affected by a number of fungal diseases some of which are destructive and may involve entire stands. The damage is sufficiently severe to hamper the acclimatization of the tree in parts of the country. The pathogens inducing defoliation include *Naemacyclus niveus* [*R.A.M.*, xii, p. 254], *Septoria* [or *Systremma*] *acicola* [ibid., xi, p. 813; xx, p. 186], believed to be recorded for the first time from Europe and certainly new to the Iberian Peninsula and the Balearic Islands, *Diplodia acicola* (also new to Spain and Portugal), and *Lophododermium pinastri* [ibid., xii, p. 604 *et passim*]. Of the two wood-rotting species occurring on *P. radiata*, *Dacryomyces palmatus* (new to the Iberian Peninsula) causes an intensive decay, resulting in the desiccation and disorganization of the wood, whereas the yellow to ochraceous rot with white patches due to *Irpex fuscoviolaceus* is of no economic importance.

The studies were extended to some neighbouring stands of *P. sylvestris* and *P. nigra* with a view to determining the role of these trees in the transmission of *L. pinastri* to *P. radiata*. The fungus in question, however, was found to be absent from *P. sylvestris* and of secondary importance on *P. nigra*, the predominant species on both of which was *Diplodia acicola*. *S. acicola* is so far confined to *P. radiata*, which appears to be a new host for the fungus. *N. niveus* is the predominant pathogen of *P. radiata*, followed by *L. pinastri*, the former having also been observed on *P. pinaster* on Mount Jaizquibel; both hosts of *N. niveus* are new for the Iberian Peninsula, the only one previously recorded for Spain being *P. montana*.

The symptoms induced by the several pathogens are briefly described and the morphology and taxonomy of the latter critically discussed. Little is known regarding the pathogenicity of *N. niveus*, which appears to assume two phases, one chronic and the other acute; in the former case the fungus is frequently observed on fallen needles of *P. pinaster* in association with *L. pinastri*, while in the latter, prevalent on *P. radiata*, fruit bodies of *N. niveus* develop on needles still attached to the tree. The available information regarding *D. acicola* is also scanty, and the author's inoculation experiments on *P. radiata* with spore suspensions of the fungus have given inconclusive results. His observations at the central nursery of Amaza-Mendi, however, have convinced him of its pathogenicity, intensive infection having been present on the needles of the distorted terminal buds of shrivelled plants.

Dealing with control measures, the author advocates as the first step the procurement of seed from healthy trees and its examination on a dextrose agar medium for superficial and internal fungal contamination before planting. Nursery precautions should include the choice of sites on non-clay soils, remote from infected stands and, where practicable, surrounded by hardwoods or at any rate by a hedge of *Cupressus macrocarpa* or oak (*Quercus rubra*), 15 to 20 in. in thickness; thorough

preparation of the soil and the application of fertilizers, sparse sowing, eradication of weeds from the beds, and the rejection of sickly and ill-developed plants at transplanting. Localities known to be favourable for the disease should be avoided.

In an appendix (pp. 61–67) are summarized the principal legislative regulations promulgated in various countries for the avoidance of the introduction and spread of certain well-known and dangerous fungal diseases of trees.

Lohman (M. L.), Cash (Edith K.), & Davidson (R. W.). **An undescribed Atropellis on cankered Pinus virginiana.**—*J. Wash. Acad. Sci.*, xxxii, 10, pp. 296–298, 1 fig., 1942.

A hitherto undescribed species of *Atropellis* was found, for the first time in 1933 and on several occasions since, on scrub pine, *Pinus virginiana*, in Virginia and North Carolina, in association with a canker similar to those caused by *A. tingens* and *A. piniphila* [*R.A.M.*, xix, p. 629]. Cultures obtained from ascospores showed a general similarity to those of *A. pinicola* Zell. & Goodd. and *A. tingens*. On malt agar the mycelial mats were erumpent, black, and uneven, of slow growth, with areas of fine, grey tomentum. An 'old gold' to 'Hessian brown' colour was induced by placing particles of a three-months-old mycelium in dilute caustic potash solution. The new species, which is named *A. apiculata*, was found to agree with the other four canker-forming species of its genus, i.e., *A. arizonica*, *A. pinicola*, *A. tingens*, and *A. piniphila*, in all features of generic importance. It has some characteristics in common with each of these four, but is distinct from all of them in the somewhat lighter-coloured hymenium as seen in expanded apothecia, in the sharply pointed to apiculate ascospores (which are hyaline, continuous at first but finally uni- or rarely biseptate, 20 to 24 by 4·8 to 6·5 μ including the apiculae 2 to 3 μ long), in the brownish epithecium largely responsible for the rich brown colour given by the caustic potash test, and finally in the apparent lack of a conidial stage. No inoculations were made, but it is assumed that the fungus is pathogenic because of its constant association with cankers and discoloured wood.

König (E.). **Pilzschäden am Holz, Polyporus borealis Fr. (Nördlicher Porling).** [Fungal damage on wood, *Polyporus borealis* Fr. (northern pore fungus).]—*Holz Zbl.*, lxviii, 37, pp. 257–258, 1942. [Abs. in *Holz Roh-u. Werkstoff*, v, 9, p. 328, 1942.]

Polyporus borealis, which normally occurs as a saprophyte on spruces, may assume a parasitic form wherever injuries afford ingress to the stem wood. The initial brown discoloration of the invaded tissues is succeeded by a white rot, primarily involving the spring layers of the heartwood, which eventually crumbles into cubical fragments. The life-history and fruit bodies of the fungus are described.

Baxter (D. V.) & Varner (R. W.). **Importance of fungi and defects in handling Alaskan airplane Spruce.**—*Circ. Mich. Sch. For.* 6, 35 pp., 8 pl., 1942.

This preliminary report on the incidence and importance of *Trametes serialis* and other fungi on Alaskan Sitka spruce (*Picea sitchensis*), studies on which are now in progress at the Michigan School of Forestry, is issued in recognition of the immediate need for information regarding the vital problem of the protection of a major source of aeroplane timber [*R.A.M.*, xxi, p. 397]. Besides the well-known *Fomes pini*, *Polyporus schweinitzii*, and *P. sulphureus*, a number of other fungi are responsible for various forms of more or less severe damage, including *P. anceps*, *P. albo-luteus*, *Poria subacida*, *P. crustulina*, *Polystictus abietinus*, *T. alaskana*, *T. heteromorpha*, and *T. variiformis*. A key is given showing the cultural features of the various species under investigation, which are further classified in a table in three groups according to their growth rates at 25°, 30°, and 35° C. Recommendations for the avoidance of fungal damage comprise stringent mill and dock sanitation, including the treatment of floorings, &c., with a disinfectant,

such as one part each of sodium fluoride and sodium arsenite to 98 parts of water, kiln-drying at 145° F. (for material up to 3 in. in thickness, lowering the temperature by 5° for each in. increase), and the preservative treatment of the individual wood pieces after manufacture and before assembly of the planes. Packing cases for plane parts should be made of sound wood, and as crates may become wet in transit parts should not be kept in them any longer than necessary. Treatment with water-repellent chemicals may be useful for parts subjected to long storage. Fungous defects are much more difficult to eradicate than structural defects of the wood, e.g., spiral grain, and new infections may occur during manufacture, shipment, or even in the plane itself. Constant vigilance is required in eliminating infected wood at all stages of handling.

Hemmi (T.), Akai (S.), & Ohno (H.). **A study on the relative resistance of the Beech wood to decay.**—*Ann. phytopath. Soc. Japan*, x, 4, pp. 304-316, 4 figs., 1941.

In the writers' experiments under controlled conditions on the relative resistance of beech (*Fagus crenata*) wood to 16 wood-destroying fungi, Hubert's designations of 'decay durability' and 'decay resistance' for the length of service of wood and its relative resistance to decay, respectively [*R.A.M.*, ix, p. 149], were adopted. The test blocks of wood were inserted into flasks containing agar cultures of *Polystictus hirsutus*, *P. sanguineus*, *Polyporus rhodophaeus*, *P. orientalis* [ibid., xviii, p. 4], *P. patouillardii*, *P. mikadoi* [ibid., xiii, p. 279], *P. schweinitzii*, *P. betulinus*, *P. sulphureus*, *Ganoderma applanatum*, *G. lucidum*, *Irpex consors*, *Stereum frustulosum*, *S. induratum*, *Fomes pinicola*, and *Trametes dickinsii* [ibid., xvii, p. 785], and maintained therein for 320 days at 24° C. The mycelia of *P. mikadoi*, *P. orientalis*, *P. patouillardii*, *G. applanatum*, and *G. lucidum* formed distinct zone lines at their points of contact with the glass walls of the flasks.

The most severe decay was caused by *P. mikadoi*, while the least effect on the wood was exerted by *S. frustulosum*, the losses in the average dry weight of the blocks exposed to these two fungi being 60·92 and 11·15 per cent., respectively. The extent of the loss in dry weight in the test blocks was not correlated with the luxuriance of mycelial growth on them. Apart from *P. mikadoi*, the agents of white pocket rot were usually characterized by sparse mycelial growth and induced slight loss in weight of beech wood; they caused the formation of pockets deep in the wood. In the case of *Polystictus hirsutus* and *P. sanguineus*, the optimum temperatures for the mycelial development of which substantially exceed that obtaining in the experiments under discussion, there was extensive rotting of the surface of the blocks, accompanied by fairly high losses of weight, but the central tissues of the wood remained in an almost sound condition. *Polyporus orientalis* and *P. schweinitzii*, which normally occur on pines and other conifers in Japan, induced the formation of white pockets and a brown cubical rot, respectively, in the beech test blocks.

Findlay (W. P. K.). **Resistance to decay.**—*Emp. For. J.*, xxi, 2, p. 134, 1942.

In standard laboratory tests carried out at the Forest Products Research Laboratory, Princes Risborough, wood of akomu (*Pycnanthus kombo*) from West Africa showed, after four months' exposure, some resistance to fungi causing brown rots (*Merulius lacrymans*, *Coniophora cerebella* [*C. puteana*], *Poria vaillantii*, and *Lenzites trabea*), whereas it was readily and severely attacked by those causing white rots (*Polystictus versicolor* and *P. sanguineus*). It is concluded that akomu is not suitable for use in any exposed situation where it might be exposed to damp conditions. Wood of 'peroba rosa' (*Aspidosperma polyneuron*) from Brazil exhibited a high degree of resistance to all the test fungi. No evidence was obtained that the variations in colour which occur in the heartwood of this species are related to variations in resistance to decay.

Findlay (W. P. K.). **Resistance to decay of Pinus strobus.**—*Emp. For. J.*, xxi, 2, p. 134, 1942.

In comparative tests [see preceding abstract] of resistance to fungal decay in *Pinus strobus* and *P. sylvestris* timbers, the average loss in weight caused by the five test fungi was 15·8 per cent. for the former and 14·0 per cent. for the latter species. It is concluded that the durability of *P. strobus* is unlikely to be any greater than that of *P. sylvestris*, and that the timber should be classified as only 'moderately resistant' to fungal decay.

Cartwright (K. St. G.). **The variability in resistance to decay of the heartwood of home-grown European Larch, Larix decidua, Mill. (L. europaea) and its relation to position in the log.**—*Forestry*, xvi, pp. 49–51, 1942.

In experiments at the Forest Products Research Laboratory [cf. *R.A.M.*, xxi, p. 311] on larch wood, which is not known to contain an extractive toxic to fungi, discs of heartwood cut from the clear bole of a 95-year-old tree at the butt, and at heights of 20 and of 40 ft., and either adjacent to the sapwood or to the pith, were exposed to sawdust cultures of *Polyporus schweinitzii* for four months, *Poria xantha* for two, and *Fomes annosus* for eight. The results showed that samples taken adjacent to the sapwood were generally more resistant (in terms of loss of oven-dry weight) than those adjacent to the pith; the only exception occurred in the case of *P. xantha* on the 20 ft. samples, where the results were exactly reversed. No explanation was found for this reversal. There was no evidence of any significant progressive variation in degree of resistance in samples according to the height from which they had been taken, except that those taken from the base were on the whole the most durable. There was indication of a progressive increase in resistance from the centre of the trunk outwards towards the sapwood, suggesting that the variation in resistance may be associated with variations in the concentration of extractive. The results of this study lend support to suggestions previously offered [loc. cit.] that heart rots in living trees might be due not only to infection through dead taproots, but also to the fact that the central core may in many species be more susceptible to fungal attack owing to absence of sufficiently high concentrations of extractives which contain substances toxic to fungi.

Hardy (E.). **Preserving pit props.**—*Colliery Engng*, xix, 216, pp. 63, 65, 1942.

The increasing cost and shortage of timber necessitate the utmost precautions on the part of colliery managers to preserve their pit props in order to reduce replacements to a minimum, and some practical recommendations are made for the application of creosote and other standard disinfectants. A very high degree of preservation, extending the life of the props three or four times, may be attained by standing them in a tank of creosote heated to 180° to 200° F. on a brick furnace for an hour or two, then letting the fire die out and leaving the props over-night. The best results are probably secured by the use of a brand of creosote containing a minimum of 40 per cent. of naphthalene fractions. Tar-oil distillates, 2 per cent. triolith (Wolman salts), 2 per cent. sodium fluoride, and a number of poisonous chemical compounds, the risks attendant on the use of which are likely to prevent their large-scale use, have also given satisfactory preservation.

Considerable misunderstanding appears to prevail with regard to the moisture-absorbing properties of timber. For instance, Douglas fir [*Pseudotsuga taxifolia*] with a 27 per cent. moisture content creosoted by pressure on arrival in England can still absorb about 33 per cent. more water than comparable samples subjected to nine months' seasoning before preservation, thereby reducing the moisture content to 20 per cent. With this species, penetration of creosote is irregular except by incisions, and end is preferable to side penetration. Scots pine [*Pinus sylvestris*]

seasons well and easily, and may be kiln-dried to 10 per cent. moisture content from the green in ten days at 200°. Reasonably good penetration of the heartwood with creosote may be secured by the open-tank or pressure process. Scots pine is second only to larch [cf. *R.A.M.*, xxi, p. 315] in natural durability, the latter being the most resistant to dry rot [*Merulius lacrymans*] of all British timbers used for pit props. It is, however, also very resistant to penetration with preservatives even under pressure, and requires rapid but careful kiln-drying to avoid splitting. Peeled timber is much more resistant to dry rot than that with the bark left on.

The spores of *M. lacrymans* frequently gain access to the wood before it enters the mine, and the timber should therefore be stacked on damp-proof foundations, e.g., old railway sleepers, bricks, clinkers, or cinders, with a ventilation space of 1 ft. between the piles, and not on the bare ground.

Herrick (J. A.) & Alexopoulos (C. J.). **A further note on the nitrogen metabolism of Stereum gausapatum Fries.**—*Ohio J. Sci.*, xlii, 3, pp. 109–111, 1942. [Abs. in *Exp. Sta. Rec.*, lxxxvii, 6, pp. 808–809, 1942.]

The growth of *Stereum gausapatum* [*R.A.M.*, xviii, p. 718] on media containing peptone, asparagin, or ammonium ions as the sole source of nitrogen was greatly increased by the addition of minute amounts of thiamin. In the case of ammonium nitrate, the development of the fungus was roughly proportional to the thiamin content of the substratum. Even in the presence of thiamin, growth on media containing only nitrate ions as nitrogen sources was negligible, failure to develop under such conditions not being attributable to toxicity.

Dillon Weston (W. A. R.) & Taylor (R. E.). **Development of Penicillium on the cut surfaces of certain vegetables.**—*Nature, Lond.*, cli, 3819, pp. 54–55, 1943.

When the cut surfaces of potato, sugar beet, turnip, Jerusalem artichoke [*Helianthus tuberosus*], carrot, and onion were dipped momentarily in a 2½ per cent. solution of copper sulphate, *Penicillium* sp. developed within five days if the surfaces were kept under moist conditions, though similar, untreated surfaces remained unaffected. A similar effect resulted when solutions or suspensions of other copper salts were tested, viz., the acetate, chloride, nitrate, carbonate, chromate, formate, and salicylate, also copper potassium sulphate and copper ammonium sulphate. When copper sulphate was used with potato, tissue discoloration preceded fungal growth. With concentrations of copper sulphate under 1 per cent. *Penicillium* sp. had not developed after seven days, though discoloration resulted at concentrations as low as 1 in 400. The nitrates of barium, bismuth, calcium, cobalt, iron, lead, magnesium, mercury, nickel, potassium, silver, sodium, strontium, and zinc were also tested, but a marked and early growth of *Penicillium* sp. occurred only when the surfaces were treated with the cobalt salt, though a smaller amount of growth developed later with nickel and iron, and very slight growth with mercury.

Plant diseases. Notes contributed by the Biological Branch.—*Agric. Gaz. N.S.W.*, liii, 11, pp. 504–510, 13 figs., 1942.

Notes are given on the principal diseases of cabbages, cauliflowers, and turnips in New South Wales and on their control by hot-water seed treatment, suitable care in the seed-bed (including spraying with Bordeaux mixture), choice of land, and crop rotation. Magnesium deficiency generally responds to an application of dolomitic lime at the rate of 2 tons per acre, made preferably a year before planting. In sandy coastal soils, symptoms of potassium deficiency take the form of a yellowing of the leaves between the veins and especially around the margins of the outer leaves where the tissue eventually dies.

Person (L. H.) & Chilton (S. J. P.). **Seed and soil treatment for the control of damping-off.**—*Bull. La agric. Exp. Sta.* 349, 16 pp., 1942. [Abs. in *Exp. Sta. Rec.*, lxxxvii, 6, p. 810, 1942.]

During a seven-year series of trials in the Sharkey and Olivier soils of Louisiana, seed treatment with red copper oxide proved to be the most practical and effective method of combating damping-off [miscellaneous fungi, including *Pythium de Baryanum* and *Corticium solani*] of tomatoes and bell peppers [*Capsicum annuum* var. *grossum*], but it was toxic to cabbage, which responded most satisfactorily to seed disinfection with vasco 4 [*R.A.M.*, xvii, p. 365] or zinc oxide. Soil treatments with commercial formaldehyde were about equally effective with red copper oxide for the control of damping-off in tomatoes and peppers, but were of little use against the disease in eggplants, post-emergence symptoms on which were further not prevented by seed disinfection with red copper oxide, but yielded to the superficial application of zinc oxide, vasco 4, or yellow copper oxide to the soil. Formalin, diluted in five or six times its volume of water, eliminated infection in tomatoes, peppers, and eggplants, but was injurious to the last-named on Olivier soil. Yellow copper oxide was the most efficient of the fungicides tested against damping-off in ornamentals, followed by red copper oxide, vasco 4, and zinc oxide in the order given. Organic mercury dusts, applied at full strength, often caused damage to the plants.

Wain (R. L.) & Wilkinson (E. H.). **A new copper seed protectant.**—*Gdnrs' Chron.*, Ser. 3, cxiii, 2925, p. 27, 1 fig. (on p. 26), 1943.

In this preliminary note on studies at Long Ashton on the treatment of early-sown peas against damping-off with copper sebacate (the copper content of which is only 24 per cent.), it is stated that trials were made with selected copper compounds, including a proprietary red cuprous oxide (89 per cent. copper) and copper sebacate, on Surprise, Eclipse, and Foremost peas in sterile and non-sterile soil, grown in boxes in an unheated greenhouse.

At equivalent copper concentrations, dilution where necessary being made by the addition of talc, copper sebacate gave higher percentage emergence (82·5, 82·5, and 96·0 for the three varieties, respectively), than cuprous oxide (63·0, 79·0, and 83·0) in non-sterile soil (the untreated controls giving 16·5, 25·5, and 71·5). The degree of copper damage as indicated by percentage emergence in sterile soil showed no significant difference between copper sebacate and cuprous oxide.

At equivalent weights of compound, the two materials gave equally good control of damping-off, in spite of the lower copper content of the sebacate, and of its lower average adherence (60 per cent., as against 94 per cent. for the cuprous oxide). In neither case was any copper damage noted. Further experiments are planned which, if successful, will permit an even greater reduction in the amount of copper used.

Davies (D. L. G.). **A Fusarium wilt of Runner Beans.**—*Trans. Brit. mycol. Soc.*, xxv, 4, pp. 418–426, 1 pl., 1 fig., 1 graph, 1942.

The wilt disease of runner beans (*Phaseolus multiflorus*) [*P. coccineus*] reported by Ogilvie and Mulligan [*R.A.M.*, xiii, p. 668], is stated to occur mainly in the Severn valley near Kempsey, and also at Pershore and Bretforton. The first symptoms may appear on the primary leaves, the margins of which become yellowish-green; later the whole leaves wither and droop, the margins rolling inwards; and finally, the entire plant wilts and dies. The disease causes a discoloration of the vascular system which sometimes seems to occur in tissue where no hyphae could be found, the fungus being confined to the xylem, though in severely infected plants it also invades the pith and cortical tissues. In experiments conducted from 1936 to 1938, the causal agent was isolated from diseased parts, and monospore cultures of the

fungus were identified by Wollenweber as *Fusarium vasinfectum* var. *lutulatum*. The fungus was tolerant of temperatures ranging from 2° [4° in the summary] to 34° C., but grew best at 28° [26°], which was also the optimum for spore germination. At this temperature the spores germinated after five hours, even after previous exposure to 15° of frost out of doors or to a moist heat of 40°. The pathogenicity of the fungus was proved by inoculating the bases (but not the stems) of plants and by sowing seed in infected soil, the results of these tests indicating that infection takes place primarily through wounds caused by soil pests. Waterlogging of the soil had no appreciable effect upon the severity of the disease. In cross-inoculation tests, conducted in the greenhouse and the field, dwarf beans (*P. vulgaris*), broad beans (*Vicia faba*), sweet peas (*Lathyrus odoratus*), and garden peas developed no symptoms. Of the varieties of runner beans tested in the field, Giant Painted Lady was outstanding in resistance to the disease, while good resistance was also shown in descending order, by Czar, Sutton's Scarlet, Giantess Painted Lady, and White Prize-Winner.

Kendrick (J. B.) & Snyder (W. C.). **Fusarium yellows of Beans.**—*Phytopathology*, xxxii, 11, pp. 1010–1014, 1942.

The vascular *Fusarium* disease of field beans (*Phaseolus vulgaris*) observed in the Sacramento Valley of California in 1929 and 1933 [*R.A.M.*, xiv, p. 207] did not reappear until 1940, when it was detected in two large plantings of pink beans, in one of which, covering 50 acres, the damage was estimated at 50 per cent., while the other contained only isolated infected plants. The symptoms of the disease include a gradual yellowing of the foliage from the base upwards, ultimate shedding of the leaves, stunting of the plants, frequently leading to their death, and a dark brown discoloration of the vascular system of the stem and leaf petioles.

The species of *Fusarium* consistently isolated from the diseased bean tissues resembled the agent of cowpea wilt (*F. oxysporum* f. [*F. bulbigenum* var.] *tracheiphilum*) in pure culture on a mixture of oats and soil, both steam-sterilized. In soil-inoculation experiments with the former, positive results were obtained only on pink and Red Mexican beans (14·2 and 25·8 per cent. infection, respectively), Lima beans (*P. limensis* var. *limenanus*) [*P. lunatus*], cowpeas, and soy-beans remaining immune. In view of the evidence furnished by field, greenhouse, and cultural studies the bean-yellows organism is designated *F. oxysporum* f. *phaseoli* n.f. It is transmissible by way of the seed, but infection from this source may be combated by seed treatment with ceresan or semesan. It was experimentally demonstrated that Lima beans, cowpeas, and soy-beans may be planted in soil infested by the bean-yellows fungus without risk of contamination.

Lachance (R. O.), Bertrand (P.), & Perrault (C.). **Manifestation extrême de la gerçure des pétioles du Céleri. Maladie par carence de bore.** [An extreme case of cracked stem of Celery. A boron deficiency disease.]—*Sci. Agric.*, xxiii, 3, pp. 187–193, 4 figs., 1 graph, 1942. [English summary.]

In 1939, celery growing in the market-garden area between Quebec and Deschambault was found to be affected by stem-cracking [*R.A.M.*, xvi, p. 792; xxi, p. 23], accompanied by dwarfing and heart atrophy. Affected plants ceased to grow towards the end of July, and brown stripes appeared on the outer petioles. The epidermis and the collenchymatous bundles split transversely, became raised at the extremities, and rolled up, forming cracks which became progressively more numerous. The petioles were rigid and brittle. The internal petioles grew very abnormally, bending over and mingling with one another, then turning brown and drying up. This process began at the extremities of the young leaflets and gradually spread to the base of the petioles, which disappeared as if reduced to powder. All that remained of the plant at the end of the season was a crown of external petioles,

the adaxial surface of which was brown and corky, surrounding a cavity. The brown bottom of this cavity was the stalk, properly so-called. This 'heart atrophy' differs from celery black-heart [ibid., xvii, p. 647] in that the former occurs only on dwarfed plants, and is always accompanied by stem crack.

The disease was prevented and normal growth obtained (on acid muck soils) by an application of 15 lb. of borax per acre [ibid., xxi, p. 442]. Soil liming appeared to favour the condition.

PRYOR (D. E.). **The influence of vitamin B_1 on the development of Cantaloupe powdery mildew.**—*Phytopathology*, xxxii, 10, pp. 885-895, 1 fig., 1942.

Of the two cantaloupe selections used in the writer's studies at the United States Horticultural Field Station, La Jolla, California, on the influence of vitamin B_1 (thiamin hydrochloride solution) on the development of powdery mildew (*Erysiphe cichoracearum*), Powdery Mildew Resistant No. 45, highly resistant to race 1 [*R.A.M.*, xvii, p. 157], was attacked by race 2 [see next abstract] whereas strain 28949, completely resistant to race 1, responded to inoculation with race 2 by the production of necrotic spots, usually without macroscopically visible mycelium. The stock culture used in the tests was probably composed entirely of race 2. The addition of the growth substance, at concentrations ranging from 0·01 to 10 p.p.m., to the soil in which the diseased plants were growing, resulted in an average increase of powdery mildew colonies on the variety No. 45 (susceptible to race 2) of 1·3 to 1·5 times over the control, while the amount of necrosis on the resistant selection 28949 exceeded that on the untreated plants by 2·1 to 2·8 times. These results are considered to be statistically significant.

When leaves from the mildew-free plants of the No. 45 variety were excised, inoculated, and maintained on a sucrose solution enriched with varying quantities of thiamin, no statistically significant effect on the disease was apparent as compared with the controls, though the lower concentrations tended to increase mycelial growth. Applications of thiamin solutions of 0·01 p.p.m. to the soil of mildew-free plants of No. 45 significantly increased mildew growth on excised leaves from these plants, inoculated and maintained on a sucrose solution. Higher concentrations of thiamin gave inconclusive results.

From these results and from indirect evidence from other work the author concludes that growth of the fungus on cantaloupe is either directly or indirectly increased by thiamin.

PRYOR (D. E.) & WHITAKER (T. W.). **The reaction of Cantaloupe strains to powdery mildew.**— *Phytopathology*, xxxii, 11, pp. 995-1004, 1 fig., 1942.

At the United States Horticultural Field Station, La Jolla, California, cantaloupe plants differing in their reactions to powdery mildew (*Erysiphe cichoracearum*) were inoculated in the greenhouse with physiologic race 2 of the fungus. The resultant symptoms are described and assigned to five classes, based on the range of mycelial development and extent of sporulation from 0 (absence of visible growth) to 4, representing an abundance of vigorously sporulating mildew growth. The leaves and cotyledons of some plants further responded by the production of faint yellow to definitely necrotic spots, usually with little or no mycelium, while a longitudinal cracking of the stems was also occasionally observed.

Duplicate plantings of 18 cantaloupe strains, comprising selections from Hale's Best (susceptible to races 1 and 2 of the mildew), Powdery Mildew Resistant Cantaloupe No. 45 (resistant to 1 but not to 2), a strain highly resistant to both races, and several selections believed to be tolerant of 1 and 2, were made in the greenhouse and on three different dates (4th and 23rd December, 1940, and 27th January, 1941) in the field. In the greenhouse all the strains except the one resistant to both physiologic races of *E. cichoracearum* developed a 4 reaction on the leaves, stems,

and cotyledons, the last-named being in general the most susceptible organ. The severity of the disease increased in each successive field planting, all the plants in the third, except those of the highly resistant selection, showing a 4 reaction. Most of the tolerant strains gave a more satisfactory performance than No. 45 in the first planting, and several were superior to it in the second.

The writers' method of obtaining data on mildew resistance, involving a study of the reactions of individual plants both in the greenhouse and subsequently in the field, is regarded as much more reliable than field trials alone for the purpose of selection.

Howard (F. L.) & Desrosiers (R.). **Studies on the resistance of Eggplant varieties to Phomopsis blight.**—*Proc. Amer. Soc. hort. Sci.*, xxxix, pp. 337–340, 1941.

In greenhouse and field trials at the Rhode Island Agricultural Experiment Station, Black Beauty, Early Long Purple, and Rhode Island hybrid (F_3—5—1) eggplant varieties were assigned indexes of 3 in a classification ranging from 0 to 4 in order of increasing susceptibility to *Phomopsis* [*Diaporthe*] *vexans* under the latter conditions as compared with one of 4 under the former. Two collections of the Brazilian Gilo variety, a tall shrub with small, red fruits, were immune, as also were *Solanum indicum*, *S. pyracanthum*, *S. mammosum*, and other unidentified types, while a high degree of resistance was exhibited by the Indian Pegan and Bengal strains.

The results of inoculation experiments carried out to determine the nature of the factor conferring resistance to *D. vexans* on certain eggplant varieties indicated that chemical or protoplasmic processes are involved rather than structural or mechanical, since the pathogen enters the leaves of both susceptible and resistant varieties by direct penetration of the upper and lower epidermal cell walls. In its parasitic phase *D. vexans* appears to be confined to living eggplants, but as a saprophyte it is capable of luxuriant growth on the sterile vegetative structures of a number of field and garden crops, e.g., cauliflower petioles, carrot roots, and beet-roots, some of which may serve to perpetuate the fungus indefinitely and thereby lessen the efficacy of rotation as a control measure.

Manuel (H. L.). **Cold storage of Grapes experiments.**—*Agric. Gaz. N.S.W.*, liii, 11, p. 533, 1942.

In an experiment on the control of mould [unspecified] on grapes in cold storage carried out in New South Wales, Ohanez grapes in cases containing 21 lb. fruit and 2¼ lb. cork were put in storage at about 31° and at 35° to 36° F. on 25th April, 1942, untreated, or with 7 gm. [sodium] metabisulphite [*R.A.M.*, xx, p. 287], 21,14, and 7 gm. sodium bisulphite, or 20 gm. flowers of sulphur mixed with the cork.

Inspection on 30th July showed that both metabisulphite and sodium bisulphite had been distinctly advantageous in preventing mould growth. The sodium bisulphite appeared to keep the stalks in better condition as regards colour than the metabisulphite, the dosage of which should probably be increased to 10 to 12 gm. per half case. The lower temperature was found to be the more suitable, and it is suggested that the storage temperature should be kept at 29°.

Further examination on 11th September showed that the storage period had then become too long, though the grapes treated with metabisulphite and sodium bisulphite (particularly the latter) were more or less free from mould.

If cases of the size used for export are treated, the amounts of the chemicals mentioned should be increased by about 36 per cent.

Pentzer (W. T.) & Barger (W. R.). **A comparison of fungicidal treatments for the control of Botrytis rot of Grapes in storage.**—*Proc. Amer. Soc. hort. Sci.*, xxxix, pp. 280–284, 1941.

None of the 12 treatments tested for the control of *Botrytis* [*cinerea*] in Emperor

grapes stored for ten weeks at 32° F. and 85 per cent. relative humidity at the Fresno (California) branch of the United States Department of Agriculture in 1940–1 proved equal to 20 minutes' fumigation by 1 per cent. sulphur dioxide [*R.A.M.*, xix, p. 25], which reduced the incidence of infection from 38·6±4·10 in the uninoculated control to 3·7±0·81 per cent. Significant decreases in the amount of rot were obtained with four other treatments, viz., ortho-phenyl phenol wraps (7·3±1·43), iodine-potassium iodide wraps (9·6±1·64), formalin spray (13·00±2·33), and ethyl alcohol dip, followed by waxing (22·8±2·64), but their undesirable effects on the fruit (except formalin) rendered them unsuitable for the purpose in view.

CUNIN (G.). **Dépérissements de la Vigne dans la région de Philippeville.** [Vine wilts in the region of Philippeville.]—*Ann. Inst. agric. Algér.*, i, 2, pp. 100–125, 9 figs., 1 graph, 1942.

An account is given of six years' investigations in the field of cases of vine wilting occurring in the vicinity of Philippeville, Algeria. Vines affected by what is termed locally 'court-noué' were found to show a whole series of somewhat similar symptoms due to parasitic or physiological causes. The author strictly confines the use of the term 'court-noué' to vines showing branches with nodes closely approaching one another, and therefore with internodes very short in relation to their diameter, but not showing the presence of any specific physiological or parasitic cause. This form of the disease represents less than 10 per cent. of the pathological cases observed in the area concerned. It is most common in places with a compacted, damp subsoil. On adult vines it is persistent, and not, as on young ones, merely associated with unfavourable climatic conditions. The available evidence indicates that the form of court-noué found in France and considered by Branas to be associated with a virus [*R.A.M.*, xix, pp. 66, 67] is rare, if at all present, locally.

More than 50 per cent. of the cases of vine wilt observed round Philippeville take the form of rachitism of the branches with pith disease. This condition generally affects young vines and occurs in all sorts of localities. The outward symptoms show no specific characters, the disease being recognized in its early stages by the presence of thin branches which lack vigour and may be unproductive. A year later, rachitism becomes apparent, the affected branches averaging not more than 25 cm. in length; they bear no bunches, but the internodes are, proportionally, of normal length. During the third year, the shoots, which are numerous and develop especially on the secondary buds, average only 10 cm. in length. On the 'cordons' the buds on the distal part fail to open. At this stage, the scanty vegetation is stunted and bushy. The leaves are very small, much deformed, and sharp-toothed. The axes of the branches are not straight and the nodes are very close together; ripening is absent or incomplete. By the spring of the fourth year, the affected vines seldom show any vegetation. Death generally ensues within three years of the appearance of the first distinct external symptoms.

If the stem and branches of an affected vine are cut open, the pith is found to be brown or black, according to the stage reached by the disease; it may even have disappeared, leaving a cavity with black walls. The discoloration frequently affects the neighbouring wood. This pith discoloration may arise (1) from pruning wounds, in which case the disease spreads downwards, (2) from the open heel of the cutting, the disease then progressing upwards, (3) from a wound in the stem, caused by a plough or pick, the disease then spreading both upwards and downwards, and (4) from two or three sites of entry simultaneously, in which case the pith of all the organs rapidly becomes affected. In the last three cases, it is evident that the disease cannot be arrested. With reference to the first, an experiment was conducted in which ten eight-year-old vines, affected with rachitism of the

branches in the second and third stages, were selected, the affected parts of the stem were cut away to a depth of 10 cm. below the soil-surface, and split grafting was carried out (in April, 1935) with grafts obtained from healthy parts of the vineyard. The young grafts have since that date remained normal and the vines have given a yield almost equal to that of healthy ones. From this it is concluded (1) that the discoloration of the pith may assume a parasitic form associated with the vegetative condition of the vine, (2) that infection does not always come from the soil, so that replanting may in some cases be advisable, and (3) that when infection takes place through pruning wounds, timely re-grafting may be undertaken in suitable soils.

Material showing the pith discoloration was sent for examination to P. Marsais, who failed to detect the presence of *Pumilus medullae* [ibid., xviii, p. 294] but who stated that, in his opinion, the fungus might be the cause of rachitism. Identical specimens were dispatched to R. Maire, who stated that the pith was invaded by sterile mycelia penetrating the wood. Thus, the organism present in the pith of rachitic vine branches has not yet been identified, but the author is certain that one or more fungi are present, perhaps saprophytically, but capable, under certain circumstances, of becoming true parasites.

This condition of rachitism of the branches accompanied by pith discoloration is found in widely different localities. Different ecological types of the disease exist, determined by the relation between the vine and the soil on the one hand, and the vine and the atmospheric conditions on the other. Three main types of this sort are distinguished. Type A is a parasitic type found in poor soils, and also affecting vines weakened by over-production. Death usually supervenes two years after the definite appearance of the pith disease, which is not able to affect all the organs before death ensues. Type B is found in damp, compacted soils. In these cases, the roots often become asphyxiated, the vine is in a poor vegetative condition, with the result that nutrition is defective, and it becomes predisposed to attack by pith disease, with penetration through the heel of the 'cutting'. Death occurs either when root asphyxiation is serious and the pith disease still in an early stage, or when only a few roots have become asphyxiated, but the pith is severely affected. Type C is the 'valley type', and occurs near river banks. The only apparent cause of weakening is slight over-production in some years; when dying vines are cut open it is seen that the pith disease, after effecting its entry chiefly through pruning wounds, has become the essential cause of the wilt, is widespread, and has reached almost its final stage of development. This takes at least three years.

The following preventive methods against pith disease are recommended. (1) Plants obtained from the nursery must be completely healthy. (2) Before planting all doubtful vines must be eliminated. (3) Avoid planting too deeply if the soil is damp and rather compact. After pruning, spraying should be effected, using sulphuric acid (10 per cent. by weight), at the same time taking all necessary precautions against attack by fungi and insects. All attempts at a cure by means of chemical fertilizers or chemical treatments are useless.

PADWICK (G. W.). **Report of the Imperial Mycologist.** — *Sci. Rep. agric. Res. Inst., New Delhi, 1940–1*, pp. 52–56, 1942.

During the period under review [cf. *R.A.M.*, xxi, p. 1] 54 wheat varieties were included in the trials for resistance to loose smut [*Ustilago tritici*]. Of these, five have remained immune for four years, and three selections maintained their resistance in the experiments under discussion, while ten other varieties have contracted no infection since their first exposure to the fungus in 1938-9 and selections among a further four are showing promise.

The best of five disinfectants tested for the control of barley covered smut (*U. hordei*) at Delhi was agrosan G, followed by sulphur dust, whereas in a

comparable series of trials at Karnal the relative positions of the two fungicides were reversed.

The general level of infection in the gram [*Cicer arietinum*] wilt (*Fusarium orthoceras* var. *ciceri*) experiment was lower during the past year than in the two previous seasons, but the high degree of susceptibility of the Imperial Pusa 9, I.P. 26, and I. P. 29 varieties, with 51, 34, and 66 per cent. disease, respectively, was confirmed, I. P. 28 again occupying an intermediate position (11 per cent.) [loc. cit.]. A well-marked correlation was observed between wilt and subsoil dryness at Karnal and Delhi, while late sowing, as in previous experiments, reduced the incidence of the disease.

Negative results were obtained in attempts to render white flies (*Bemisia gossypiperda*) infective for the tobacco leaf-curl virus by feeding them on juice extracted from diseased plants, thereby failing to confirm the partially successful outcome of previous tests.

Some interesting observations, in addition to those already mentioned, were made in connexion with the epidemic of red rot (*Colletotrichum falcatum*) in the sugar-cane crops of northern Bihar and the eastern United Provinces [ibid., xxi, p. 347]. For instance, quite a close association was established between the occurrence of *C. falcatum* and that of wilt (*Cephalosporium sacchari*). A good deal of secondary red-rot infection was found to take place through the nodal region: out of some 1,000 affected canes examined from 69 localities, 228 showed evidence of invasion of the upper stem nodes without any sign of basal rot.

Roguing was once more found to be efficacious in the control of sugar-cane smut (*U. scitaminea*), only 44 diseased clumps having been eradicated over an area of 13·6 acres in April and May, 1941, as against 319 for the corresponding period of 1940.

A species of *Cytospora* was responsible for a severe die-back and decortication of pears in the North West Frontier Province.

A new species of *Phyllosticta* caused a leaf disease of *Hibiscus sabdariffa* at Dacca.

Bertus (L. S.). **Plant pathology.** *Adm. Rep. Dir. Agric. Ceylon, 1941*, p. D5, 1942.

During the period under review [cf. *R.A.M.*, xxi, p. 66], the presence of mycorrhiza on cardamom roots was found markedly to stimulate production and to benefit the health of the trees, which gave unsatisfactory yields on soils where these structures were absent, presumably owing to deficiency of organic matter.

The mosaic of *Hibiscus esculentus* was found to be transmissible by white flies fed on infected plants, denoting its virus origin. A disease of young coco-nut palms resembling the 'bitten leaf' of Jamaica [ibid., xv, p. 136] is tentatively attributed to *Thielaviopsis* [*Ceratostomella*] *paradoxa*.

A stem and leaf disease of two Indian varieties of *Piper betle* now established in Ceylon, caused by *Colletotrichum piperis* [ibid., xix, p. 260], is prevalent, but readily controllable by spraying the vines with colloidal copper.

An experimental consignment of Surat ginger from Hong Kong was severely infected by *Pythium myriotylum*, but successful multiplication was effected by the isolation of healthy seed pieces from the diseased clumps.

Cross (W. E.). **Notas sobre el progreso de la agricultura y las industrias agropecuarias de Tucumán durante los últimos sesenta años.** [Notes on the progress of agriculture and the livestock industries of Tucumán during the last sixty years.]—*Bol. Estac. exp. agríc. Tucumán* 36, 75 pp., 11 figs., 1942.

Included in this review of the advances made in the progress of agriculture (with special reference to the sugar-cane industry) during the past sixty years in Tucumán, Argentine, are references to a number of cane pests and diseases, including the newly discovered smut (*Ustilago scitaminea*) [*R.A.M.*, xxi, p. 481],

ring spot (*Leptosphaeria sacchari*), lineal leaf spot (*Phyllosticta sacchari*), cold [banded] chlorosis, ring rot (*Melanconium* [*Pleocyta*] *sacchari*), root disease, stump rot, and spring chlorosis [ibid., xviii, p. 237]. Fungi occurring on the same crop in other parts of the Republic but not yet recorded in Tucumán comprise sooty mould [*Capnodium* spp.] in Santa Fe and Corrientes, red rot (*Colletotrichum falcatum*) in Salta, and wilt (*Cephalosporium sacchari*) and black rot (*Ceratostomella paradoxa*) in Jujuy.

Braun (A. C.) & Laskaris (T.). **Tumor formation by attenuated crown-gall bacteria in the presence of growth-promoting substances.**—*Proc. nat. Acad. Sci., Wash.*, xxviii, 11, pp. 468–477, 3 figs., 1942.

An attenuated culture of *Phytomonas* [*Bacterium*] *tumefaciens* (Hendrickson and collaborators' A66) [*R.A.M.*, xiv, p. 289] was experimentally shown to be capable of inducing the formation of large tumours in Bonny Best tomato plants in the presence of the growth-promoting substances, α-naphthalene-acetic acid, β-indole acetic acid, and γ-indole butyric acid, applied three times at seven-day intervals at concentrations of 0·5, 1, 1·5, and 2 per cent. in lanoline to the decapitated stems. The excrescences resulting from treatment with α-naphthalene-acetic acid approximated most closely to those arising from the virulent culture used for comparative purposes, being white and of irregular contour in contrast to the brown, regular outgrowths due to the other substances. It was further demonstrated, by means of grafting tests, that the cells of the artificially induced tumours can be transplanted in series and give rise to neoplasms reaching a diameter of 3 to 4 cm. in four to five weeks in their new hosts. Some of the tumours developing in this manner were apparently free from bacteria [ibid, xxi, p. 6; xxii, p. 12]. Without the aid of the growth-promoting substances the attenuated culture was unable to stimulate cellular multiplication to any appreciable degree.

Riker (A. J.) & Baldwin (I. L.). **Names for the bacterial plant pathogens.**—*Chron. bot.*, vii, 6, pp. 250–252, 1942.

The authors stress the need of an adequate system for the classification of bacterial plant pathogens, stating that at present workers in the United States occasionally still use Migula's or E. F. Smith's classification, in rare cases employ classifications developed abroad, while most follow Bergey's system. While the last-named system is considered superior to all previous ones, it is still not entirely satisfactory as closely related non-pathogenic forms fail to appear in proper relationship to the pathogens. It is hoped that when an improved system of classification is worked out, physiologically related groups of organisms will be found placed together. For the study of bacterial pathogens the consideration of pathogenic together with attenuated or closely related non-pathogenic cultures is of extreme importance. Essential also is the purity of cultures, and single-cell isolations should be used when single-colony cultures show critical variability.

Mehta (K. C.). **Control of rust-epidemics of Wheat and Barley.**—*Indian Fmg*, iii, 6, pp. 319–321, 2 pl., 1942.

Summarizing the results of a prolonged investigation into the problem of cereal rusts [*Puccinia* spp.] in India [*R.A.M.*, xx, p. 292], the author states that with nearly 35,000,000 acres under wheat, India is at present the largest producer of wheat in the British Empire. All three rusts, yellow, brown, and black [*P. glumarum*, *P. triticina*, and *P. graminis*, respectively] are moderately common. Yellow rust, because of the heat, does not thrive in the plains of Peninsular India, where brown rust is also rather scarce, but in the Nilgiris and Palni hills all three rusts are abundantly present. The yellow and black rusts also attack barley, which

covers nearly 8,000,000 acres. The source of all three rusts lies in the hills [ibid., x, p. 710; xviii, p. 511]; yellow rust, unable to oversummer at heights below 6,000 ft., would appear to be blown down from higher altitudes, while the other two are probably disseminated from comparatively low elevations.

Owing to the earliness of the local crops, central Nepal in the north and (taken together) the Nilgiris and Palni hills in the south provide two important foci of infection. In addition, hills 6,000 ft. high or more are potential foci of all three rusts, and black and brown rusts may occasionally be disseminated from altitudes of nearly 4,000 ft. and above.

In the hills the incubation period may vary from three to four weeks, but in the plains it generally lasts only 10 to 12 days.

The best method of control would be to suspend the cultivation of wheat and barley in the hilly areas for two or three years. Alternatively, only resistant varieties should be grown in the hills, but such varieties have not yet been developed. A third possible method would be to destroy all 'out-of-season' wheat and barley (self-sown plants, ratoon tillers, and stubble) one to two months before sowing in all hilly areas. Lastly, in view of the small acreage under early crops in the Nilgiris and Palni hills and central Nepal, suspension of the first crop (sown during April–June) in the first two areas and postponement of sowings in the third area to October should offer effective control in most of Peninsular India and the Indo-Gangetic plain, respectively. The last two methods are thoroughly practicable and at the same time inexpensive. They have been approved for trial by competent bodies of the Imperial Council of Agricultural Research and by a number of scientists outside India, and it now remains for the provincial Governments and the States concerned to test their efficacy over a number of years simultaneously. For the success of control by 'clean-up' all those owning land in the hills as well as every cultivator in these areas must co-operate.

Newton (Margaret) & Johnson (T.). **Adult plant resistance in Wheat to physiologic races of Puccinia triticina Erikss.**—*Canad. J. Res.*, Sect. C, xxi, 1, pp. 10–17, 1943.

The reaction of nine wheat varieties, in the seedling as well as in the heading stage, to *Puccinia triticina* [*R.A.M.*, xx, p. 354] (races 1, 2, 3, 5, 9, 15, 20, 27, 28, 29, 31, 34, 39, 41, 44, 52, 53, 58, 71, 76, 83, 89, 103, 104, and 130) was studied at Winnipeg, Manitoba. In greenhouse experiments it was found that the wheat variety Regent, susceptible or moderately so to seven races in the seedling stage, was resistant to all of them and to 12 additional races in the heading stage; Renown, moderately resistant as a seedling, showed in maturity increased resistance to all the 19 races tested. In the field, both varieties showed similar adult resistance to races 5, 9, 71, and 76. It is suggested that in these two wheat varieties, and possibly in other derivatives of H–44 and Hope, adult resistance to *P. triticina* may be a generalized phenomenon comparable to their resistance to *P. graminis tritici*. The varieties Thatcher, Apex, Marquis, Reward, and Kenya R. L. 1373, susceptible in the seedling stage to all the races tested, showed an adult resistance to some only of these races. This type of resistance, not previously observed against other cereal rusts, is considered to be of little practical value unless the particular races against which it is operative should happen to predominate in a natural epidemic. The McMurachy variety was found to be susceptible in both stages of development, although it showed slight adult resistance to one race only in the field. Finally, Warden × Hybrid, tested only in the field, proved immune from, or highly resistant to, all four races used. Adult plant resistance was observed to be usually greatest in the uppermost leaves, diminishing downwards.

Holton (C. S.). **Extent of pathogenicity of hybrids of Tilletia tritici and T. levis.**—*J. agric. Res.*, lxv, 12, pp. 555–563, 1942.

In studies of 50 hybrids obtained from crosses either between *Tilletia tritici* [*T. caries*] (races T–8, T–9, T–10, and T–12) and *T. levis* [*T. foetida*] (races L–7 and L 8) or between races within these species [*R.A.M.*, xxi, p. 284], approximately 83 per cent. of the inter-species hybrids proved capable of perpetuating themselves as against only 59 per cent. of the inter-race hybrids. On the other hand, the latter were more productive of new pathogenic segregates than the former. The segregates from the various hybrids varied largely in pathogenicity, some being less and others more virulent than the parent races, while still others showed virulence equivalent to that of the parents. Several hybrids were pathogenic to the wheat variety Hussar × Hohenheimer, which is highly resistant to all known races of the bunt fungi, indicating entirely new combinations of pathogenicity factors. It is concluded that pathogenicity in the two fungi is apparently controlled by genetic factors and inherited on a multiple-factor basis. Factors for pathogenicity and spore morphology are inherited independently. The selective influence of the host variety is considered of importance in the expression of pathogenic properties and the establishment of new physiologic types resulting from hybridization.

Tyner (L. E.) & Broadfoot (W. C.). **Studies on foot and root rot of Wheat. VII. Some factors affecting the health of Wheat seedlings in nutrient solutions.**—*Canad. J. Res.*, Sect. C, xxi, 1, pp. 18–25, 1943.

In further studies in Alberta on the foot-rot diseases of wheat caused by *Helminthosporium sativum* and *Fusarium culmorum* [*R.A.M.*, xvii, p. 784; cf. also xx, p. 397], the effect of iron tartrate on the development of chlorosis in wheat seedlings grown in nutrient solutions, and also the effect of extracts of the two pathogens on disease expression, were studied in the greenhouse. Less iron was required in summer than in winter, but generally the addition of ferric tartrate solution at the rate of 1 ml. of 0·5 per cent. strength per 1 l. of nutrient solution three times a week proved effective in preventing chlorosis all the year round. Less iron was required in solutions with a hydrogen-ion concentration adjusted to P_H 5·5 twice weekly than in those with an approximately neutral reaction. The addition of manganese appeared to have no effect on chlorotic development in wheat seedlings grown in nutrient solutions deficient in iron. Sterilized and unsterilized filtered extracts of the two fungi added to the nutrient solutions were found to inhibit the growth of wheat seedlings, an effect interpreted as an expression of pathogenicity.

Briggs (F. N.) & Stanford (E. H.). **Linkage relations of the Goldfoil factor for resistance to mildew in Barley.**—*J. agric. Res.*, lxvi, 1, pp. 1–5, 1943.

In continued studies in California on the inheritance of resistance to mildew (*Erysiphe graminis hordei* race 3) in barley [*R.A.M.*, xx, p. 356], the authors investigated a cross between the resistant variety Goldfoil (Goldfoil factor, Ml_g, for resistance), which is hulled, awned, and white, but carries the Bl factor for blue aleurone and develops red pigment in the stems under favourable light conditions, and the susceptible Nepal 595, which is naked, hooded, and white, but has the Bl_1 factor for blue and green stems. It was found that mildew resistance in the progeny of this cross was linked with hooded (K) with a cross-over of 18·77 ± 2·33 per cent., and with the Bl factor, 26·31 ± 5·05 per cent. The two factors K and Bl have been shown by other workers to be linked with a value of 22·58 ± 0·82 per cent. and assigned by them to linkage group IV. As these factors enter in the repulsion phase, the probable errors are considered to be relatively high and the order of the three genes under consideration not clearly indicated. The order suggested is Bl, K, Ml_g. The red colour of the stems was found to be due to a single factor designated Rs, linked with hulled (N), 14·50 ± 1·06 per cent., and with a

second factor for blue aleurone (Bl_1) with a cross-over value of 9·07 ± 1·24 per cent. These genes have been assigned to linkage group III. The order of these three genes is again not clearly indicated, but is suggested to be N, Bl_1, Rs.

Tapke (V. F.) & Bever (W. M.). **Effective methods of inoculating seed Barley with covered smut (Ustilago hordei).**—*Phytopathology*, xxxii, 11, pp. 1015–1021, 1 fig., 1942.

A tabulated account is given of experiments in Idaho and New York State in 1936 and 1937 in the inoculation of the Hannchen, Odessa, and Trebi barley varieties with covered smut (*Ustilago hordei*) [*R.A.M.*, xix, p. 697] by two methods involving modifications of Haarring's 'evacuation' technique for the infection of oats with *U. avenae* (*Bot. Arch.*, xxix, pp. 444–473, 1930), both of which proved greatly superior in the production of the disease to the standard practice of coating the surface of the seed with spores, the averages of infection obtained at three stations in 1936 by the two new methods (spore suspension and spore suspension under vacuum) being 46·9 and 49·5 per cent., respectively, compared with 16·8 for dusting the seed. The three essential features of the modified technique are (1) pre-treatment of the seed-grain with formaldehyde, followed by washing in water and drying to eliminate surface-borne contaminants and loosen the hulls round the caryopsis, thereby materially enhancing the effectiveness of the inoculation besides incidentally increasing the efficacy of dusting with copper carbonate; (2) covering the seed with spores in suspension, which are carried beneath the hulls and brought into proximity with the site of invasion, as under natural conditions; and (3) 16 to 20 hours' storage of the inoculated seed-grain in a moist state to promote spore germination and the spread of inoculum before drying and sowing.

Although the vacuum method resulted in slightly heavier infection than the spore-suspension technique the latter appears to be more advantageous and simpler of application for large-scale inoculations, particularly those entailing a study of physiologic specialization.

Dillon Weston (W. A. R.) & Taylor (E.). **Seed disinfection V. The stripe diseases of Barley and Oats.**—*J. agric. Sci.*, xxxiii, 1, pp. 23–27, 2 pl., 1943.

In this paper [cf. *R.A.M.*, xxi, p. 131] the authors state that in 1924, 15 samples of oat seed were received at the Official Seed Testing Station, Cambridge, from farmers who reported that sowings from this seed had failed in the previous season; all the samples showed the presence of *Helminthosporium avenae* [ibid., xxii, p. 128], infection ranging from 20 to 70 per cent. Of 100 samples of Scottish seed examined 77 showed infection, which ranged from 5 to 95 per cent. In 1932–3, 50 random samples of oat seed received at Cambridge were examined, and 48 were found to be infected, infection ranging from 2 to 68 per cent. In 1942, 100 random samples from the 1941 crop were examined, and 90 were found to be infected, the degree of infection ranging from 1 to 98 per cent., and reaching over 50 per cent. in 24 of the samples.

From 1923 to 1942 the incidence and intensity both of this disease and of barley leaf stripe (*H. gramineum*) [loc. cit.] were studied in the field and in experimental plots. Numerous barley and oat crops in East Anglia were examined, and surveys were also made periodically in Norfolk, Suffolk, and Cambridgeshire. From 1923 to 1933 it was exceptional to find a commercial crop in the seedling stage completely unaffected. In 1925, a high germinating sample of Black Supreme seed oat known to be infected with *H. avenae* was sown in the field; 4,560 seeds were sown, of which 2,001 emerged. Primary *H. avenae* injury (visible above ground) was shown by 916 seedlings, and *H. avenae* infection of, probably, a secondary nature by 126. There were only 781 healthy seedlings. Of the 1,042 seedlings which showed *H. avenae* injury, 50 died later on. Some seedlings which failed to braird, developed

mycelia and spores of *H. avenae* after incubation, indicating that the underground rotting had been due to pre emergence blight caused by the fungus. In this case, while only 5 per cent. of the attacked seedlings which appeared above the ground died, 56 per cent. of the total seed sown was killed before emergence, the evidence indicating that this mortality was partly due to *H. avenae*.

Little progress was made in control by seed treatments until organo mercury seed dressings became available, from 1932 onwards [loc. cit.]. In 1941–2 six well-known such dressings (A to F) were tested for the control of barley leaf stripe, with copper sulphate, copper carbonate, and formalin. Treatments A to F gave, respectively, 0·27, 0, 0·18, 0, 0·38, and 0·19 per cent. affected seedlings, as against 32·53, 33·37, 33·7, 36·87, 34·42, and 33·54 per cent. for the corresponding untreated controls, while the figures for copper sulphate, copper carbonate, and formalin were, respectively, 6·59, 29·43, and 27·77 per cent., as against 32·78, 37·63, and 34·39 for the controls. Dressings B, C, and D were used at the reduced rates of 1 oz. and ½ oz. per bush.

Experimental evidence was obtained that barley straw infected with *H. graminearum* may be a fertile source of secondary infection, plots strewn with such straw showing from 8·02 to 18·32 (mean 14·51) per cent. infection compared with 0·062 per cent. for the control.

It is the killing of oat seedlings by *H. avenae* and barley seedlings by *H. graminearum* between germination and tillering that offers such a serious problem. The authors' field observations showed that when climatic conditions favour the rapid germination and development of the seed and seedling, mortality is low, but if growth is interfered with by adverse climatic conditions, mortality is high. The primary phase is therefore more severe in cold, wet localities than in those that are warmer and drier. Although severely infected seed may produce only low mortality if favourable weather enables the seedlings to escape infection, farmers should, nevertheless, treat their seed before sowing with a reliable organo-mercury dressing as an insurance.

Tervet (I. W.) & Hart (Helen). **Variation in reaction of Anthony Oats to stem rust, Puccinia graminis avenae.** *Phytopathology*, xxxii, 12, pp. 1087–1090, 1 fig., 1942.

Experimental evidence is adduced for the existence of two morphologically indistinguishable strains of Anthony oats, one of which is susceptible to physiologic race 5 of stem rust (*Puccinia graminis avenae*) in contrast to the normally resistant reaction of the variety [*R.A.M.*, xvii, p. 309]. Some 15 per cent. of a total of 500 adult plants proved to be susceptible to the disease in field plots at St. Paul, Minnesota, and there is thought to be no doubt that the seed lots of Anthony available in the State contain a high proportion of susceptible material. These observations and those of other workers on cereal rusts point to the advisability of periodical re-selection within varieties that have been bred for resistance to a particular pathogen.

Elliott (Charlotte). **A Pythium stalk rot of Corn.** — *J. agric. Res.*, lxvi, 1, pp. 21–39, 11 figs., 2 graphs, 1943.

A stalk rot was observed on two inbred lines of yellow dent maize, K167 and C.I. 6, at the Arlington Experiment Farm, Virginia, in 1940. The infection appeared very suddenly after heavy rain followed by hot weather and ceased as abruptly when the temperature went down. The rot, usually confined to the lower internodes, affected all tissues of the stalk except the vascular bundles, causing the plants to fall over, while the tops remained green and turgid for several days after. The rotted, dark brown, water soaked areas were clearly separated from the healthy tissues by a line of demarcation, often of a purplish or lavender

tinge. The fungus isolated from diseased tissues in pure culture was identified by C. Drechsler as *Pythium butleri*, and its pathogenicity was proved in field and greenhouse inoculations. These were successful on both wounded and unwounded stalks, but only under conditions of high temperature and humidity. Twelve inbred lines and C. I. 6, inoculated in the greenhouse, varied in their resistance to the fungus, C. I. 5, Ia. L289, C. I. 4, and C. I. 540 being susceptible, and Ill. Hy. and Ky. 13 resistant. Squashes (*Cucurbita pepo*) and cucumbers inoculated with cultures of the fungus were rapidly covered with dense mycelium and developed water-soaked areas.

A similar stalk rot was observed in a small field of hybrid maize near Petersburg, Virginia, in 1941. Although isolations from the rotted stalks failed to yield *P. butleri*, probably owing to the known difficulty of isolating species of this genus, the disease is believed to be identical with that described above.

Leukel (R. W.). **New fungicides and reduced fungicide doses for the control of kernel smut of Sorghum.** *Phytopathology*, xxxii, 12, pp. 1091–1093, 1942.

A tabulated account is given of experiments at the Bureau of Plant Industry Station, Beltsville, Maryland, and at seven other locations in the mid- and southwest on the control of covered smut of sorghum [*Sphacelotheca sorghi*] by the application to Sharon Kafir seed grain, previously inoculated with spores at the rate of 1 gm. per 100 gm. of new improved ceresan (½, ¼, and ⅛ oz. per bush.), copper carbonate, spergon, thiosan (Du Bay 1205-FF) containing 50 per cent. tetramethylthiuram disulphide, Du Bay 870 (100 per cent. ferric dimethyl dithiocarbamate), captax (100 per cent. mercaptobenzol-thiazole), obtainable from the R. T. Vanderbilt Company, sanoseed (2·2 per cent. ethanol mercuric chloride) from the Ansbacher Siegle Corporation, M.T.D.S. (morpholine thiuram disulphide) supplied by M. C. Goldsworthy, and dusting sulphur (Stauffer Chemical Company), all at dosages of 3, 1½, and ¾ oz. per bush. Spergon gave perfect control of the disease, which was further reduced to an average of under 0·1 per cent. by thiosan and Du Bay 870 at all concentrations, while M.T.D.S. and copper carbonate were only slightly less effective. Captax and sulphur gave fairly satisfactory results at full strength, being superior to new improved ceresan, the two year-old sample of which had evidently deteriorated; sanoseed was useless for the purpose in view. The incidence of infection in the untreated control rows ranged from 7·8 to 43·4 (average 25·2) per cent., so that uniformly exacting conditions for the treatments were not provided. However, the outstanding success of the applications with the new materials, thiosan, Du Bay 870, and M.T.D.S. at all rates (the first-named already on the market as a fungicide for turf [*R.A.M.*, xix, p. 656; xxi, p. 383], the two latter still in the experimental stage), and with captax (used in rubber manufacture) at the maximum strength, indicates their potential value in the control of certain diseases of other crops. Emergence was most consistently benefited by thiosan, Du Bay 870, copper carbonate, and spergon.

Phenyl mercury oleate prevents mildew in experiments on tents used to fumigate for control of insect pests of Citrus. *Agric. News Lett.*, x, 4, pp. 80–81, 1942. [Abs. in *Biol. Abstr.*, xvii, 1, pp. 281–282, 1943.]

Phenyl mercury oleate [*R.A.M.*, xxii, p. 144] is an effective compound for the control of mildew on the tents used for fumigation operations against citrus pests, being highly antiseptic, water-insoluble and therefore not subject to leaching, relatively non-volatile, and does not react with hydrogen cyanide in such a way as to impair its utility or injure the trees. Applications of 0·2 lb. of the compound per 100 lb. fabric should prevent the development of mildew for two or more seasons, provided reasonable care is taken after treatment.

Reiniger (C. H.). **Contribuição ao estudo dos possíveis insetos vetores de virus dos "Citri" no Brasil.** [A contribution to the study of the potential insect vectors of 'Citrus' viruses in Brazil.]—*Bol. Esc. nac. Agron., Rio de J., 1941*, 2, pp. 225–245, 8 figs., 1942. [English summary.]

The etiology of zonate chlorosis of citrus in Brazil [*R.A.M.*, xvii, p. 595] is still unknown, but assuming it to be due to the agency of a virus, the author carried out detailed studies on a number of potential insect vectors, a full description of which is given.

Vasudeva (R. S.). **Cotton root-rot control in the Punjab.**—*Indian Fmg*, iii, 11, pp. 592–593, 1942.

The results of the author's experiments in the Punjab on the control of cotton root rot (*Rhizoctonia* [*Corticium*] *solani* and *Macrophomina phaseoli*) by mixed cropping, here briefly summarized in a semi-popular form, have already been noticed from another source [*R.A.M.*, xxi, p. 450].

Vasudeva (R. S.). **Root-rot disease of Cotton in the Punjab.**—*Indian Fmg*, iii, 10, pp. 536–538, 3 figs., 2 graphs, 1942.

The results of experiments carried out during the last seven years at Lyallpur and Khanewal, Punjab, indicate a close correlation between the date of sowing of American and 'desi' cotton (Mollisoni 39) and the mortality from root rot (*Rhizoctonia* [*Corticium*] *solani* and *Macrophomina phaseoli*) [see preceding abstract], a marked reduction in the incidence of which was observed in the early April and late June plantings. In Mollisoni 39 plots at Lyallpur, for instance, the amount of infection in a recent test fell from 61 per cent. in the May sowings to 11 and 3 per cent. in those of mid- and late June, respectively. In American cotton in the locality the mortality among plants of 4th April and 16th May, 1940, sowings was 0·05 and 46·66 per cent., respectively, the corresponding figure for the plot laid down on 30th June (which gave the heaviest yield) being 0·76 per cent.; similar results were also obtained at Khanewal. The average annual loss from root rot over the entire province of the Punjab, where the crop occupies an area of 3,100,000 acres (1937–8), may be roughly estimated at 3 per cent., representing an approximate financial loss of Rs. 3,150,000.

Dastur (R. H.) & Singh (S.). **Studies in the periodic partial failures of the Punjab–American Cottons in the Punjab, VI. The effect of sodium salts on growth of plants and development of tirak.**—*Indian J. agric. Sci.*, xii, 4, pp. 603–626, 1 pl., 12 graphs, 1942.

Section I of this report deals with the writers' investigations at the Punjab Agricultural College, Lyallpur, on the growth of native and American cotton varieties in (*a*) normal soils in which 'tirak' (bad opening of the bolls) [*R.A.M.*, xxi, p. 449] was absent, (*b*) and (*c*) sandy loams and light sandy soils, respectively, with saline subsoils where the disease was known to occur, while in section II a tabulated account is given of the results of experiments to determine the effects of artificial applications of sodium salts to a non-saline normal field on the development of American cotton plants.

The growth and yields of the crops were found to be depressed in the presence of salinity in the subsoil, especially in sandy loams, 'tirak' being observed in all such cases and also developing in fields to which sodium chloride was applied at the rate of 16,000 lb. per acre. This compound appears to be chiefly responsible for the disorder under discussion, the first-named author and K. M. Samant (*Indian J. agric. Sci.*, 1942) having shown that the bicarbonate and sulphate are not toxic at the concentrations in which they normally occur, while the carbonate is not always present in susceptible soils. The presence of salts other than the chloride

may, however, aggravate or lessen 'tirak', according to their relative proportions and concentrations.

RAY (W. W.). **The effect of Cotton seed dusting on emergence of seedlings in soil infested with Rhizoctonia.**—*Phytopathology*, xxxiii, 1, pp. 51–55, 1943.

A tabulated account is given of a series of tests at the Oklahoma Agricultural Experiment Station in the control of *Rhizoctonia* [*Corticium*] *solani* on Deltapine cotton [*R.A.M.*, xxi, p. 331], grown in heavily infested greenhouse soil, by seed-dusting with a number of chemicals. Emergence was substantially improved by treatment with new improved ceresan, Du Bay 1155–HH (ethyl mercury iodide), Du Bay 740–A (ethyl mercury borate), Du Bay 1228–R (methyl mercury naphthol sulphamide), and spergon, all applied at the rates of 3 gm. per kg. seed; but the differences in the subsequent survival of plants from the disinfected and control lots were not statistically significant, so that the practice of seed-dusting cannot be regarded as an effective means of combating post-emergence damping-off of cotton seedlings in soils containing an abundance of inoculum of *C. solani*.

BERGER (E. W.). **Status of the friendly fungus parasites of armored scale-insects.**—*Florida Ent.*, xxv, 2, pp. 26–29, 1942.

This is a discussion, supplemented by personal observations, of the investigations of P. H. Rolfs (*Bull. Fla agric. Exp. Sta.* 41, 1897) and of the same author and H. S. Fawcett (ibid., 94, 1908) on the entomogenous fungi parasitizing Coccids on citrus, viz., the red-headed scale fungus, *Sphaerostilbe aurantiicola* [*R.A.M.*, xv, p. 216], with which the pink scale fungus, *Nectria diploa*, is thought by some mycologists to be synonymous, the white-headed scale fungus [*Podonectria coccicola*], and the black scale fungus, *Myriangium duriaei* [ibid., xx, p. 61]. *S. aurantiicola* is easily spread to trees infested by this Coccid by simply transferring fungus material. It is able to destroy large numbers of insects without any external sign of its presence: according to W. B. Tisdale, its fruiting bodies are produced on the lower surfaces of leaves that become inverted and so exposed to a stronger light, a similar phenomenon also being apparently essential to the formation of fructifications by the brown white fly fungus (*Aegerita webberi*) [ibid., xvii, p. 161]. *P. coccicola* is believed to have been largely instrumental in arresting a severe outbreak of the long scale [*Lepidosaphes gloveri*, Pack.] in the thirties of the nineteenth century, when the insect was introduced into Florida on citrus trees and caused heavy losses. *P. coccicola* was also the dominant parasite of *L. gloveri* and the purple scale [*L. beckii*, Newm.] towards the close of the same century and the opening of the twentieth, but it is not considered to be indigenous to the State since it has not been detected on native Coccids. *M. duriaei*, another active parasite of Coccids, possesses the drawback of adhesion to the fruits during their preparation for the market.

VERRALL (A. F.). **Fungi associated with certain ambrosia beetles.**—*J. agric. Res.*, lxvi, 3, pp. 135–144, 5 figs., 1943.

In the course of a study begun in 1937 by the Division of Forest Insect Investigations, Bureau of Entomology and Plant Quarantine, United States Department of Agriculture, the following four fungi new to science were found associated with ambrosia beetles in the Southern States: *Endomyces bispora* associated with *Platypus compositus*; *Cephalosporium pallidum* with *Xyleborus affinis*; *C. luteum* with *X. pecanis*; and *Monilia brunnea* with *Pterocyclon mali* and *P. fasciatum*. These fungi are apparently used as food by the beetles and probably cause the restricted black or brown stain in the wood adjacent to the tunnels of the beetles.

McKeen (C. D.). **A ring spot disease of Gladiolus corms.**—*Canad. J. Res.*, Sect. C, xxi, 1, pp. 1–9, 1 pl., 1 fig., 1943.

A hitherto undescribed disease affecting the corms of stored gladiolus is reported from Vineland, Ontario, under the name of ring spot. The disease is likely to become important economically, as it renders appreciable numbers of corms of certain varieties unfit for sale as propagative lines. The symptoms, which appear in most varieties after 2 to 2½ months of storage or after three or more on a few, consist of somewhat conspicuous, irregularly concentric rings round a node or a root initial. According to the variety, the rings are either narrow, dark reddish-brown and close together or broader and more widely spaced, with occasionally a band of healthy tissue between them. The lesions are at first slightly elevated, but later may quite often become somewhat depressed and hard in texture. They occur more frequently on the lower half of the corm, but in severely diseased specimens both the lower and the upper halves are equally affected. It is generally necessary to remove leaf scales from the corm to determine the presence of the disease with certainty, but in many cases the husks are discoloured and lack lustre. The disease development did not respond to any appreciable extent to modified temperature and moisture conditions of storage, and did not generally progress beyond the seventh month. The progeny of diseased corms produced apparently healthy foliage and bloom, but the corms harvested from such plants invariably developed symptoms in storage.

Histological studies showed that the lesions rarely extend deeper than 15 cells into the corm (or only nine in the variety Amrita). In old lesions groups of collapsed, brownish cells are frequently located near nodes, extending rather deeply into the corm tissue. The lesions are separated from the healthy tissue by a periderm layer five to ten cells thick, which is formed soon after the infection becomes apparent, and may be in part responsible for the small dimensions and shallow depth attained by some of the lesions. From a comparison of susceptible varieties with the apparently resistant King Lear and Camellia, resistance to ring spot would not seem to be due to any obvious morphological characteristics of the corms.

Repeated attempts to isolate a causal agent yielded no single organism consistently, and none of the *Penicillium* and *Fusarium* spp. isolated proved pathogenic in inoculation experiments. Although the exact nature of the disease has thus not yet been established, the author suggests that it is most likely caused by a soil fungus of a low order of aggressiveness, developing at first saprophytically on the corms in storage until such time as conditions become favourable for attack.

Severin (H. H. P.). **Infection of perennial Delphiniums by California-Aster-yellows virus.**—*Hilgardia*, xiv, 8, pp. 411–430, 8 pl., 1942. [Abs. in *Biol. Abstr.*, xvii, 1, pp. 275–276, 1943.]

Delphinium is a relatively uncongenial host of the short-winged (*Macrosteles divisus*) and long-winged leafhoppers, some of which died on the colonized plants after four to six hours and most within 24, hence the delay in the detection of the identity of the virus of California aster yellows on garden varieties [*R.A.M.*, xix, p. 22]. The principal symptoms of infection are dwarfing of the plants and a bunchy growth of short stems; a general foliar chlorosis; phyllody (approximation of the floral organs to leafy structures); and virescence, due to the replacement of floral pigments by chlorophyll. The average experimental infection of two-year-old plants by four vectors viz., the two above-mentioned, *Thamnotettix montanus*, and *T. geminatus*, before and after spike development, was 86·2 and 70 per cent., respectively. The average percentages of virus recovery from naturally and artificially infected *Delphinium* plants by the mountain, geminate, short- and long-winged leafhoppers were 18·3, 14·3, 3·8, and 11·7, respectively. Plants infected

after spike development did not invariably produce green flowers with abnormal floral organs, but after the blossoming period they put out a dense cluster of short, yellow shoots from the crown. The geographical range of the aster-yellows virus hitherto determined embraces Oregon, Washington, Utah, Wyoming, and Colorado, of which the three first-named and Idaho are centres of the newly discovered *Delphinium* disease and harbour either the mountain or geminate leafhopper, or both.

SEVERIN (H. H. P.). **Celery calico on perennial Delphiniums and certain other host plants.**—*Hilgardia*, xiv, 8, pp. 441–445, 6 pl., 1942. [Abs. in *Biol. Abstr.*, xvii, 1, p. 276, 1943.]

The symptoms of celery calico [*R.A.M.*, xviii, p. 369] on perennial *Delphinium* are restricted to the basal and intermediate leaves and include pale or lemon-yellow or amber areas, and line or ring patterns. The incubation period of the disease ranged from 11 to 178 days. Plants infected either naturally or artificially during the first year may act as symptomless carriers in the second. Calico is often associated with aster yellows in *Delphinium* [see preceding abstract] under natural conditions, and the inoculum from such plants produces calico but not aster-yellows symptoms. The aster-yellows virus was recovered from the virus complex by three species of leafhoppers. Tomato plants may contract infection by a mixture of viruses. Cucumber plants inoculated with the virus extract filter out ordinary tobacco mosaic and retain the calico virus, of which nine species of aphids were demonstrated to be vectors.

LIMBER (D. P.) & FRIEDMAN (B. A.). **Erwinia carotovora, the cause of a soft rot in Orchids, Cattleya sp.**—*Phytopathology*, xxxiii, 1, pp. 80–82, 1 fig., 1943.

The organism isolated in pure culture from orchids (*Cattleya* sp.) in New Jersey sporadically affected by a dark, water-soaked rot of the leaves, pseudo-bulbs, and rhizomes was identified as *Erwinia carotovora*, apparently not hitherto reported on this host. Wrinkling of the epidermal tissues of the foliage follows their collapse. The exudate commonly present on the diseased organs turns very dark brown on drying. Inoculation experiments were successful on wounded tissues only of *C.* sp. and *C. mossiae*, foliar decay becoming apparent 24 hours after infection, and complete involvement of the leaf occurring in four to seven days at room temperature. The bacteria readily travel from the leaf to the pseudo-bulb and rhizome, causing the death of the plant. In addition to *Cypripedium* and *Cymbidium*, which were artificially infected by Matsumoto and Okabe with the strain of *E. carotovora* from *Phalaenopsis aphrodite* [*R.A.M.*, x, p. 735], the writers induced soft-rot symptoms on excised leaves of *Oncidium*, *Odontoglossum*, *Brassavola*, and *Lockhartia*.

SMITH (C. O.). **A leaf spot of Hibiscus sp. induced by Phytomonas syringae.**—*Phytopathology*, xxxiii, 1, pp. 82–84, 1 fig., 1943.

The organism cultured from the brown to black, water-soaked spots, 1 to 10 mm. in diameter, sometimes encircled by a yellowish-green zone or halo, on *Hibiscus* leaves in a coastal city of California presented the characters of *Pseudomonas syringae*, and inoculations with the pathogen through wounds on *Hibiscus* leaves and lemon fruits induced the typical symptoms of the disease. Cross-inoculation experiments with the lemon and lilac isolates of the bacterium on *Hibiscus* were likewise successful. Further critical comparative studies are necessary to determine the exact relationships between the various strains of *P. syringae* [*R.A.M.*, vii, p. 515] and the organism described from Japan by Nakata and Takimoto under the name of *Bacterium hibisci* [ibid., ii, p. 413].

STARR (M. P.) & PIRONE (P. P.). **Phytomonas poinsettiae n. sp., the cause of a bacterial disease of Poinsettia.**—*Phytopathology*, xxxii, 12, pp. 1076–1081, 1942.

A technical diagnosis is given of *Phytomonas poinsettiae* n. sp. (or *Corynebacterium poinsettiae* when this group is emended to include motile forms [cf. *R.A.M.*, xxi, p. 364]), the agent of a destructive disease of poinsettia (*Euphorbia pulcherrima*) in New Jersey, New York, Maryland, and Pennsylvania, the most prominent symptoms of which are longitudinal, water-soaked, generally unilateral streaks on the green stems, sometimes continuing upwards into the petioles and leaves and resulting in spotting or blotching and total defoliation, and downwards into the woody stem, inducing cortical yellowing and a brown discoloration of the vascular system. At an advanced stage of infection the stems rupture and bend sharply down towards the unaffected side. Cuttings from affected plants do not develop normally, and in one greenhouse both they and the stocks from which they originated were a complete loss. The causal organism was isolated in pure culture from diseased plants and inoculated into healthy ones with positive results, recovery of the pathogen being effected. Positive results were also obtained by W. H. Burkholder with two of the isolates. Control measures have not yet been fully worked out, but in the meantime the writers advocate the rejection of propagating material, even when apparently healthy, from stocks known to harbour the bacterium, the isolation of rooted cuttings and young plants of sound origin from those of doubtful sources, and the restriction of overhead watering and syringing to avoid the spread of infection.

The cultural characters of *P. poinsettiae* on a number of standard media are described. The non-acid-fast organism is highly pleomorphic, occurring as straight rods, comma-shaped, curved, coccoid, clavate, wedge-shaped, and bizarre involution forms, singly or in palisade arrangement; capsules are formed in some sugar-containing media; motility is effected by one polar or lateral flagellum, biflagellate forms being rare; the dimensions range from 0·5 to 8·5 by 0·2 to 0·8 (average 1 to 3 by 0·3 to 0·6)μ; the initial Gram-positive reaction changes into a variable response to Hucker's modification of the Gram stain; litmus milk is rapidly peptonized a week or two after inoculation and blood serum liquefied in three to ten days. On tryptose phosphate broth growth occurred between 15° and 36° C. after 24 hours and from 7° to 12° after 48, but none was made at the end of a week between 0·5° and 5° or 37° and 50°. Acid was produced in moderate to abundant quantities from glucose, fructose, mannose, galactose, sucrose, maltose, cellobiose, melibiose, raffinose, glycerol, erythritol, salicin, and amygdalin, and in smaller amounts from arabinose, xylose, and lactose; starch was hydrolysed in 11 days and gelatine liquefied in three at 23°.

Report of the Committee on Post-war Agricultural Education in England and Wales.—H.M. Stationery Office, London, 92 pp., 1943, 1s. 6d.

This report of the Luxmoore Committee contains proposals for the reorganization of agricultural education under a National Council responsible for, *inter alia*, the advisory service in plant pathology. Six advisory provinces are proposed instead of the present 13.

Service and regulatory announcements July–September 1942.—*S.R.A., B.E.P.Q., U.S. Dep. Agric.*, 152, p. 65, 1942.

Under Proclamation No. 34 (29th June, 1942), the importation into Jamaica of cotton or any other plant of the species *Gossypium* or a variety thereof is admissible only under a permit from the Director of Agriculture. No consignment of cotton seed may exceed 1 ton in weight. All cotton seed imported into the Island shall immediately be fumigated and before planting shall be immersed for not less than three minutes in concentrated sulphuric acid or disinfected with an approved fungicide.